Demographic and psychosocial profile of disruptive mood dysregulation disorder in Indian settings

ABSTRACT

Aims: The aim of this study was to assess the demographic and psychosocial profile of the children with and without disruptive mood dysregulation disorder (DMDD) attending psychiatric and pediatric OPD and evaluation of the phenomenology of children diagnosed with DMDD. Materials and Methods: Children of 6–16 years attending the psychiatric outpatient department were screened by self-made peer-reviewed questionnaire and further underwent diagnostic evaluation using DSM 5 diagnostic criteria. Socioeconomic status (SES) was assessed using the Kuppuswamy scale. Affective Reactivity Index (ARI) was used to measure the severity of irritability. Overall behavioral problems were assessed on Conner’s parent rating scale and impairment in functioning on the Children’s Global Assessment of Functioning Scale. Results: A total of nine subjects were diagnosed with DMDD out of 500. The mean age of children with DMDD was higher than other children. DMDD children had better SES. Multiple psychosocial factors such as broken family, family history of psychiatric illness, and childhood adversities including sexual abuse were found to be a contributory factor. Those diagnosed with DMDD had significant conduct and learning problem along with moderate to severe irritability and a mean CGAS value of 50.66 which implies that children with DMDD had moderate impairment in functioning. Conclusions: DMDD cases have male preponderance, urban background, and belong to upper and middle socioeconomic strata. Conduct problems, academic decline, hyperactivity, impulsivity, and mild degree of impairment in anxiety, along with moderate to severe irritability produce impairment in their overall functioning of these children.

Keywords: Disruptive mood dysregulation disorder, irritability, mood disorder in children, psychosocial profile

Disruptive mood dysregulation disorder (DMDD) manifests with persistent angry mood or irritability, along with frequent temper outbursts that are not consistent with the circumstances and much more severe than the reaction expected from same-aged children/adolescents. The concept of this new diagnostic entity arose due to a rise in the emergence of mental disorders namely depressive disorders, bipolar affective disorders, and anxiety disorders in the childhood period (1–10 years) reaching a peak in adulthood (10–29 years).

Toward the end of the last century, clinicians had asserted that the presentation of mania in children and adolescents differs in comparison to adults. Diagnostic and Statistical

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Manual of Mental Disorders (DSM-IV) (1994) defined pediatric mania as persistent, nonepisodic, severe irritability in comparison to the distinctive period of the euphoric or irritable mood of adult mania.[2] The subsequent debate over the boundaries of the disorder leads to a dramatic increase (40-fold) in the diagnoses of bipolar disorder in children and adolescents in both outpatient and inpatient settings over a decade in the USA.[3] This led to an increased use of mood stabilizers, antipsychotics in the treatment of children and adolescents presenting with irritability and mood symptoms. This resulted in a raging debate over prevalence and presentation of pediatric bipolar disorder.[4] Later studies were conducted to test whether nonepisodic irritability is a developmental presentation of bipolar disorder or not, and a syndrome called severe mood dysregulation (SMD) was described where irritability was defined under domains of extreme and frequent temper outbursts and mood changes (anger or sadness) between outbursts. However, long-term follow-up of patients with SMD revealed that majority of them suffered from the unipolar depressive disorder but not bipolar disorder.[5,6]

As irritable mood according to DSM-IV could be a manifestation of a range of psychiatric disorder in children and adolescents such as mood, anxiety, bipolar disorder, major depressive disorder, acute stress disorder, oppositional defiant disorder, attention-deficit/hyperactivity disorder (ADHD), conduct disorder, autism spectrum disorder, psychoses and substance use, and children suffering from this irritability were still undiagnosed. The DSM-5 taskforce further proposed a diagnosis of DMDD which was included in the section of depressive disorder.[7]

DMDD manifests with recurrent and severe outbursts of temper that are inconsistent with the situation. The outbursts are observed at least three times a week for at least a year. In between the outbursts, the subjects are usually irritable. This is observed by parents, teachers, or peers. The symptoms are present for at least 12 months and in at least two settings (at home, at school, or with peers). DMDD diagnosis should not be made for the first time before age six or after age eighteen years.[8] This severe and chronic irritability affects their psychosocial functioning. In view of the paucity of Indian studies done on this relatively new entity, the present work was undertaken to assess the demographic, psychosocial profile, and pathophysiology of this disorder in Indian settings.

**MATERIALS AND METHODS**

This descriptive, cross-sectional study was conducted from July 2016 to September 2018 in a tertiary care hospital located in the semi-urban area of a metropolitan city. The study protocol was approved by the institutional ethics committee. Informed consent was obtained from parents and assent from older children.

**Sample**

The study sample consisted of consecutive patients in the age range of 6–16 years attending psychiatric or pediatric outpatient departments, without mental retardation, seizure disorder, and head injury. Children were screened using an 8 point self-made peer-reviewed questionnaire to screen for DMDD[Appendix 1]. Children scoring 2 or more were selected and further evaluated for DMDD. The diagnosis of DMDD and other psychiatric diagnoses (as per DSM-5 criteria) was assigned by qualified psychiatrists in the department.[9] In this process, 1857 children were screened to obtain the requisite 500 patients to fulfill the sample size requirement which was previously derived.

**Inclusion criteria**

- Children and adolescents in the age range of 6–16 years
- Those children whose parents have given written informed consent and agreed to participate in the study were included.

**Exclusion criteria**

- Head injury
- Seizure disorder
- All cases of intellectually impaired (mentally retarded) children/adolescents in the above age range.

**Tools**

*Screening questionnaire for disruptive mood dysregulation disorder*

This tool was made in the department by consensus of two senior professors in psychiatry. The questionnaire was peer-reviewed by two senior psychiatrists and approved by the college scientific committee. It consisted of 8 questions with binary yes/no answers, which indicates the presence of irritability (low threshold in experiencing anger),[9] mood changes, and academic or behavior problems among the children. This questionnaire was administered to parents and cutoff score of more than 2 was selected [Appendix 1].

*Kuppuswamy scale 2017 version*

Kuppuswamy’s socioeconomic scale, devised by Kuppuswamy in 1976 is a composite score of education and occupation of the head of the family along with the monthly income of the family. This scale classifies the study populations into the higher, upper middle, lower middle, upper-lower, and lower SES. For the present study, corrections were applied for the year in which the patient was examined according to the standard prescribed procedure.[10]
Conner’s Parent Rating Scale: By Goyette, Conner’s, and Ulrich (1978)

It provides a qualitative and quantitative picture of children’s behavior and emotion based on 5 subscales assessing conduct problems, learning problems, psychosomatic, impulsive-hyperactive, and anxiety along with “Hyperactivity Index” which has 10 items that are considered to be sensitive to treatment effects. Test–retest factor reliabilities of the parent questionnaire is similar to teacher questionnaire ranging from 0.70 to 0.90 The long-term test–retest value is 0.85 and internal consistency is 0.61–0.95 The 5 factors coefficient are anxiety factor = 0.90, conduct problem factor = 0.94, learning problem factor = 0.63, impulsive hyperactive factor = 0.70, psychosomatic factor = 0.91, and hyperactivity index the intrarater parent correlation for the hyperkinesis index was 0.55.[11]

Affective Reactivity Index

It is a brief scale designed to focus on irritable mood in children. This scale was used in DSM-5 field trials. This scale was specially designed to examine three aspects of irritability namely threshold for an angry reaction, frequency of angry feelings, and duration of such feelings. It has self- and parent-reported version. It is validated in children ages 6–17. The internal consistency of the Affective Reactivity Index (ARI) is high. In terms of test–retest reliability, there was a high level of agreement between ratings by adults on the ARI 1 week apart.[12–14]

Children’s Global Assessment Scale

This scale is a modification of the Global Assessment Scale; it is delineated to measure the lowest level of functioning in a child or adolescent. The intraclass correlation coefficient was 0.84, a value denoting excellent agreement. The scale also has good stability when measured from repeated-measures analysis of variance, comparing the rater’s mean scores obtained at the two periods. The difference between the mean CGAS score for outpatient and inpatient was significant at the level of 0.001.[15,16]

Procedure

Data were noted under the following headings: demographic details, socioeconomic status (SES), presenting complaints, past history, family history, and diagnosis were documented for all the screened patients (n = 500). The sample was divided into three groups: those with DMDD (n = 9), those with other psychiatric diagnoses (n = 368), and those with no diagnosis (n = 123). Children who were diagnosed with DMDD were further evaluated for the severity of irritability using ARI. The detailed assessment of phenomenology was done by applying Conner’s Parent Rating Scale and impairment in global functioning was assessed using Children’s Global Assessment Scale (C-GAS).

Statistical analysis

Statistical comparison between three populations – DMDD, “other psychiatric diagnosis,” and “no diagnosis” (n = 9, 368, and 123, respectively) was done. Quantitative variables were analyzed in terms of mean and SD; qualitative data were depicted in number and percentage. Test of significance was applied using software SPSS 20 (IBM, Chicago, USA). Demographic and psychosocial data were compared among the three groups using the Pearson Chi-square test or Fisher’s exact test.

RESULTS

The mean age of the screened sample was 10.50 ± 2.78 years. The children who were diagnosed with DMDD had a mean age of 11.45 ± 1.64 years which was higher than the mean age of the entire screened sample. More than 50% of children presenting to the OPD were males in both the groups. Children with DMDD had higher percentage of depression, alcohol dependence syndrome, and bipolar disorder in their families in comparison to children and adolescents with other diagnoses [Table 1].

Statistical significance was found between the age group and SES of the children between the diagnosed, DMDD and no diagnoses group. All the DMDD cases were from urban background, and most of the cases with other psychiatric disorders were also from urban background this finding was not statistically significant [Table 2].

Presenting complaints such as irritability, poor academic performance, verbal aggression, and pain in the abdomen were statistically significant (in which group, from which group) However, physical aggression and hyperactivity were majorly (means, in proportion or severity) seen among the screened population [Table 3].

More than 65% of children with DMDD faced psychosocial problems like parental issues namely divorce, separation or death of a parent, and children growing away from parents. Another contributory family problem was sibling rivalry which was seen in 44.44% of cases. A history of sexual abuse was noted in 11% of cases. On the other hand, 7% of children with other psychiatric disorders reported child sexual abuse, more than 5% of children complained of family problems such as parental separation, sibling relation problems, and about 2% had problems related to their education [Table 4].

Among children with DMDD, moderate amount of conduct problems were present in 77.78% and 22.22% had severe conduct problems. Moderate learning problems were present in 55.56% and 33.33% had severe learning problems. A moderate amount of impulsive-hyperactivity was seen in 44.44% and mild amount of psychosomatic and anxiety problems were present in 55%–77% of children [Figure 1]. Phenomenology of irritability as per ARI, the self- and parent-reported questionnaire is
presented in Table 5. In the self-reported version, 88.88% had mild to moderate amount of irritability and 11.11% had moderate-severe irritability. The average score being 6.66 ± 2.05 which denotes moderate to severe irritability. On parent-reported version of ARI, only 22.22% of cases had mild-moderate irritability and 77.77% had moderate to severe irritability. Irritability reported by parents was statistically significantly higher than the irritability reported by children themselves. This implies that there is a difference in reporting of irritability when the comparison
was made between self and parent version of ARI. The mean C-GAS score of the children with DMDD was 50.66; it is observed that around 66.66% of children had a moderate amount of impairment in functioning and 22.22% had major impairment [Table 6].

### DISCUSSION

According to the census of 2011, 30.9% of the total population range between the age group of 0 and 14 years.\[^{17}\] Despite this large number, only a few studies in our country have assessed the impact of mental health problems or mood dysregulation in children and adolescents. In the present study, the subjects were chosen by screening a large sample of 1857 patients in the age range of 6–16 years by a screening tool designed within the department. Previous studies done in community in other countries have evaluated 3250 participants.\[^{18}\] In our study, 9 children out of 500 (1.8%) were found to have DMDD. This rate agrees with a previous study which gave a 3-month prevalence of 0.8%–3.3% in a large population covering age group from 2 to 17 years.\[^{19}\] Another study reported a prevalence of 0.12% when all the criteria of DMDD were applied.\[^{4}\] The WHO reports that 50% of mental health problems are established by age 14 and 75% by age 24.10% of children and young people (aged 5–16 years) have a clinically diagnosable mental problem\[^{3,20,21}\] In this study, as well, we found similar age distribution as the mean age of the screened children is 10.50 ± 2.78 years and the majority of children with other psychiatric disorder were present in the age range of 6–14 years. The mean age of children with DMDD is 11.45 ± 1.64 years; this finding is similar to hospital-based Indian study (11.14 ± 2.95)\[^{22}\] and community-based studies in other countries (10.5 ± 2.9).\[^{23}\] Analysis of the association between age and the diagnosis of DMDD showed that children between the age range of 9–14 years were more likely to be diagnosed with DMDD.
Table 6: Results of children’s global assessment scale of disruptive mood dysregulation disorder patients

| Children’s global assessment scale | Number of cases, n (%) |
|-----------------------------------|------------------------|
| Major impairment                  | 2 (22.22)              |
| Moderate                          | 3 (33.33)              |
| Some                              | 3 (33.33)              |
| Variable                          | 1 (11.11)              |
| Total                             | 9 (100)                |

It is commonly seen in the Indian setting that a male child is generally brought to the attention of medical personnel for health-related problems far earlier than female children. We have found similar results where boys (55.8%) outnumbered girls (44.2%) in the screened sample in the outpatient department; this finding is observed in many Indians studies in children as well. In cases of DMDD, male preponderance (3.5:1) was observed which stands in accordance with other Indian studies. However, some studies done in other countries reported no sex difference among DMDD children. A logical reason for this difference cannot be given currently due to the scarcity of research done in Indian settings.

The precise nature of the relationship between mood disorder in children and adolescents and poverty is unknown, but speculations made by the National academy of Sciences reports that children living in poverty are at increased risk of having mental illness. Supporting this finding studies done on lifetime risk of depression indicate that a low SES in childhood is related to a higher risk of depression in later life. Our study found that majority of cases of depressive disorders belonged to low SES and who had other psychiatric diagnoses were from the lower middle and lower class. Our findings are in agreement with an earlier study. However, children having DMDD were from middle SES, implying that DMDD may occur in children with better socioeconomic background, whereas other psychiatric diagnoses have their roots in a poorer environment. Previous studies have not done any statistical correlation about SES in our country and this finding stands unique to our study.

Earlier studies done in children and adolescents in other psychiatric disorders and DMDD groups in Indian settings have found an urban preponderance which is a finding common to ours. Hence, it can be assumed that parents living in the urban background are more aware and disquieted about their children’s health-related problems. On the contrary, it is a matter of some concern that rural children were under-represented in this study. The implication that lesser rural patients were availing mental healthcare services provided at no/minimal cost at this institution and others which is easily accessible, points to the need for public health education to raise mental health awareness among those residing in the rural area of this country.

It is often found that presenting complaints differ for children in comparison to adults. Unadorned irritability is one of the most frequent reasons for presentation to mental health services, followed by emotional and behavioral dysregulation which are often observed among the referrals. In children, vague pains, recent academic decline, school truancy, aggression in any form, or any other behavioral or physical aberration always draw the attention of parents. We also found that irritability, poor academic performance, and verbal aggression was significantly higher in children with DMDD and other psychiatric disorders, while pain in the abdomen was significantly higher in children without psychiatric disorders. Previous studies done by Chaudhury et al. have also reported that most of the children attending the psychiatry OPD have complaints regarding their behavioral and emotional disturbances, whereas children with DMDD mostly complained of irritability, verbal aggression, poor academics, frequent anger outburst, physical aggression, hyperactivity, low mood, and school refusal; past hospital-based studies done on DMDD also reported irritability, verbal rages, and physical aggression as the most common presenting complaints. Studies done in community mental health clinic reported predominance of thought problem, anxiety, and depressive symptoms as the presenting complaint in cases of DMDD. All these complaints clubbed together greatly impact the development of these children.

The presence of family history of psychiatric disorders always makes the patient vulnerable and susceptible for the development of mental disorders. In this study, we found that a significant number of children with other psychiatric diagnoses had family history of alcohol dependence syndrome, depression, or psychosis. These findings are similar to the study done by Nayak et al. where the most common family history among the children and adolescents attending health-care services were depression (29%) psychoses (18%), and substance-related disorder (11%). One unique finding to this study is that children who presented with behavioral disturbances which do not account for any diagnoses also had family history of mental disorders. Studies done by Sparks et al. and Propper et al. reported that family history of mood or substance disorder is a strong predictor of DMDD; in this study, we also found that majority of children with DMDD had family history of ADS, depression, and bipolar disorder. However, there are no studies which show the prevalence of ADS in family members of DMDD, this finding is unique to this study.
Early childhood adversities in the form of any kind of psychological, physical or sexual abuse, or even the upbringing in absence of parents can lead to multiple psychiatric morbidities in the future such as depression, substance use, and increased risk-taking behavior in the later part of life. During the course of this study, it was noted that many non-DMDD patients had a history of some kind of childhood tribulations. Psychosocial stressors such as history of childhood sexual abuse, absence of parents, broken families, and sibling rivalry were found in non-DMDD cases; these findings are similar to previous studies where it was noted that many children presenting to health services had a history of child sexual abuse (17%)[32] sibling relation problems (37%),[23] conversion and conduct disorder in adulthood.[32]

So far limited studies have been performed which throw light on household or other socioecological factors that might subsidize the development of DMDD and other psychiatric disorders. Interpersonal trauma or exposure to adversities like child sexual abuse are widely acknowledged as being associated with affective dysregulation but so far, no study has examined trauma, abuse, neglect, parenting, family history as a risk factor for DMDD.

However, we observed that DMDD children faced significant psychosocial problems like significant family history of mental illness like depression, bipolar disorder, ADHD, and substance use disorder. Among other factors, many children of DMDD were from a family where parents’ marital status was in disharmony, there were two children who were raised by their grandparents, as their parents were undergoing marital problems. There was one case of DMDD who had a history of childhood sexual abuse.

Patients often reasoned the cause of their irritability as neglect, faced by them, due to the birth of their sibling or when the parents failed to pay appropriate attention to them. Parents also reported that retrospectively they noticed that the episodes of irritability or anger outbursts would increase after any conflict occurred in relation to their sibling. In this study, it was observed that 50% of cases had significant sibling relation problems; this finding was not commonly reported in other studies, but it is unique and prominent in this study.[36]

**Phenomenology of children with disruptive mood dysregulation disorder**

Previous studies with the parental version of Connor’s scale have reported a significant amount of learning, impulsive/hyperactivity, anxiety, and behavior problems in children with DMDD,[22,28] and we also found that children with DMDD have moderate to severe impairment in conduct, learning, impulsivity, and hyperactive domain, while mild degree of impairment was found in anxiety and psychosomatic domain. The presence of psychosomatic problems comports with the finding that somatic problems can be a frequent presenting problem in DMDD patients. With predominant conduct and learning problems and combination of other factors, the overall development of a child can be impaired and it can make them more vulnerable for further academic decline or school dropouts. It may even precipitate substance-related psychiatric disorder or other serious legal and social problems in adulthood.

Chronic nonepisodic irritability is the basis of the diagnosis of DMDD and assessment of irritable mood is best done by the ARI, the self, and parent-reported questionnaire.[6,14] Clinically significant irritability occurs commonly in children and adolescents and was the most common presenting complaint in our study. The self-reported version of ARI shows a mild to moderate amount of irritability, whereas the parent-reported version of ARI shows moderate to severe irritability. Irritability reported by parents was statistically significant than the irritability reported by children themselves. This difference was noted in previous studies as well.[23] However, the average of both the versions indicates that children with DMDD had moderate to severe irritability, which finally implies that these children have a low threshold to anger in response to negative stimuli and they get frustrated easily. The current assessment of the global functioning of children revealed that children with DMDD have a mean CGAS value of 50.66 which implies that the average child with DMDD has moderate impairment in functioning in several areas and faces severe difficulty in functioning in one area. Previous studies have reported that children with DMDD have significant impairment in functioning.[32]

**Limitations**

It is a hospital-based study and the findings of this study cannot be generalized. A larger community-based sample would be required to help in understanding the prevalence of this condition.

**CONCLUSIONS**

DMDD cases have male preponderance, urban background, and belong to upper and middle socioeconomic strata. They have multiple psychosocial stressors such as family history of psychiatric illness, parental deprivation, sibling relationship problems, and child sexual abuse. Conduct problems, academic decline, hyperactivity, impulsivity, and mild degree of impairment in anxiety and psychosomatic domain along with moderate to severe irritability produce some amount of impairment in their overall functioning.

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Conflicts of interest
There are no conflicts of interest.

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Appendix 1: Screening Questionnaire

(If two or more answers to the above are in the affirmative, the child will be taken up for further inquiry as per the protocol)

1. Is your child irritable very often?
2. How often does your child have temper tantrums?
3. Has the child's school performance declined?
4. Does the child's mood change often during the week?
5. Are there any complaints from the school regarding his/her behavior?
6. Does he/she indulge in verbal rages?
7. Does he/she indulge in physical fights?
8. Does the child have frequent physical complaints?