Original article

Prevalence of depression and anxiety among mothers of children with neuro-developmental disorders at a tertiary care centre, Puducherry

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ABSTRACT

Background: Parents of children with neuro-developmental disorder (NDD) experience psychiatric disorders like depression and anxiety; and mother being the main care-giver is at a higher risk. Socio-demographic conditions of the families also augment depression.

Objective: To estimate the prevalence of depression and/or anxiety among mothers of children with NDD availing care at a tertiary care centre, Puducherry, India.

Materials and methods: We conducted a cross sectional study from among mothers of children with NDD attending the paediatric clinics between September and October 2019. All mothers were administered PHQ-9 and GAD-7 tools to screen for depression and anxiety, respectively. Those who failed the screens were administered the MINI International Neuropsychiatric Inventory (MINI-PLUS) version 7.0.2 to confirm the diagnosis of depression and anxiety. Prevalence of depression and/or anxiety were presented with 95% confidence intervals.

Results: A total of 120 mothers were included. Of those, mothers of children with epilepsy were maximum (40%) followed by Attention Deficit Hyperactivity disorder (27%), Intellectual Disability (14%), Cerebral Palsy (12%) and Autism spectrum disorder (7%). Of the total, 52 mothers were screened positive for depression and 46 (37.5%, 95%CI 29.2–46.4) were diagnosed with depression. As for anxiety, 91 mothers were screened positive and 52 (43.3%, 95% CI 34.7–52.3) were diagnosed with anxiety. 36 (30% 95% CI 22.3–38.6) mothers had both depression and anxiety.

Conclusion: Depression and anxiety were common among mothers of children with NDD. Hence screening and counseling of these mothers need to be considered.

1. Introduction

Neuro-development among children is a dynamic inter-relationship between various components which includes brain, genetic, cognitive, emotional and behavioral processes across the lifetime of the child.¹ The common neuro-developmental disorders (NDD) among children are epilepsy, cerebral palsy, attention deficit hyperactivity disorders, autism spectrum disorders and intellectual disability. Recent studies done in middle income countries and India have showed prevalence of NDD to

be nearly 7.5% and 9% respectively.¹

Often the disabled child is in need of support, with respect to physical needs, social needs and emotional well-being, and for this they rely on their family, particularly the mother. Care of a neuro-developmentally disabled child is a huge challenge for the parents and they are always at an increased risk of suffering from other psychopathologies like anxiety and depression.² Studies have shown that the prevalence of depression and anxiety among these mothers to be as high as 68% and 52% respectively. Mothers are reported to be more depressed owing to

Abbreviations: NDD, Neuro-developmental Disorders; ASD, Autism Spectrum Disorder; ADHD, Attention Deficit Hyperactivity Disorder; INR, Indian National Rupees.

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their need to balance between the needs of the child and household chores, and without any added help, they might feel isolated, over-burdened and dissatisfied with their life.^{2,3}

Mothers have also reported of not getting enough sleep, lack of participation in exercises, not having regular, nutritious diet and failing to seek any medical advice for them resulting in: clinical anxiety and depression, isolation from social gatherings, social activities, higher stress and poor quality of life.^{2–4} The expected risk of psychopathologies among the mothers of children with cognitive problems can be intensified by the socio-economic condition of the family⁹ (Borst et al., 2010).

Although the overall burden of psychiatric morbidities among these mothers is quite high and associated with poor outcomes in children, policies and practices mainly serve only the children with neuro-developmental disorder.⁵

In India, there is limited literature focusing on the parental impact of raising children with NDD and their risk of developing various psychopathologies. Hence, it is important to fill this lacuna as well-being of the mother is directly correlated with the well-being of the child and the family.² Therefore, we conducted this study to find the proportion of mothers of children with NDD having depression and or anxiety attending a tertiary care center, Puducherry and its association with the socio-demographic factors and child characteristics.

2. Materials and methods

2.1. Study design, population and setting

We conducted a facility based cross-sectional analytical study in the out-patient department of a tertiary care center, Puducherry, India from February to December 2019. Patients from Puducherry and neighboring districts of Tamil Nadu and state of Kerala avail services from this centre. The study was conducted among the mothers of children with selected NDD attending follow-up clinics for their children in: the high-risk newborn clinic under the department of neonatology with a daily OPD of 12–15 children as well as in child neurology and child psychiatry weekly clinics under the department of paediatrics with the weekly OPD attendance of 20–25 children. A Psychiatrist was a part of the two above mentioned clinics to treat the mental health problems and conditions of the children. Data was collected in the month of September and October 2019. The selected NDDs included in our study were epilepsy, cerebral palsy, intellectual disability, Attention Deficit Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (ASD).

2.2. Sample size

Assuming the proportion of anxiety and depression among mothers to be 45.9% and 45.2% respectively^{5,6}, respectively with 20% relative precision and alpha error of 5% (95% confidence level), sample size was calculated to be 114 for depression and 117 for anxiety using OpenEpi version 3.01 software. A sample size of 117 was finalized, however, a total of 120 mothers were interviewed for the study. Consecutive eligible mothers were included.

2.3. Data variables, sources and data collection

We captured socio-demographic information of the mothers like age, education, occupation, monthly family income, chronic illness and family history of psychiatric disorders using a semi-structured questionnaire. Information about the characteristics of children like age, gender, type of neuro-developmental disorder and age at diagnosis was obtained from the case records of the child.

Screening of mothers for depression and anxiety was done using Patient Health Questionnaire-9 (PHQ-9) and Generalized Anxiety Disorder-7 (GAD-7) questionnaire, respectively. These questionnaires are validated in Tamil language by CMC Vellore earlier, so the necessary permissions for using the same was sought before start of the study.

Table 1

Socio-demographic characteristics of mothers of children with NDD and their children attending a tertiary care center, Puducherry, 2019 (N = 120).

Characteristics	Categories	Number (percentage)
Age (years)	≥30	78 (65.0)
	<30	42 (35.0)
Education (years)	0–10	78 (65.0)
	11 and above	42 (35.0)
Marital status	Married	114 (95.0)
	Widow	6 (5.0)
Type of family	Nuclear	62 (51.7%)
	Joint	58 (48.3%)
Family history of psychiatric disorder	Yes	5 (4.2)
	No	115 (95.8)
Monthly family income (INR)	<4000	35 (29.2)
	4000–4999	31 (25.8)
	5000–10000	27 (22.5)
	>10,000	27 (22.5)
Chronic illness in mother ^a	Yes	11 (9.7)
	No	109 (90.3)
Gender of the child	Male	82 (62.3)
	Female	38 (31.7)
Associated co-morbidities in child ^b	Yes	71 (59.2)
	No	49 (40.8)
Epilepsy	Yes	48 (40.0)
	No	72 (60.0)
ADHD	Yes	32 (26.7)
	No	88 (73.3)
Intellectual disability	Yes	17 (14.2)
	No	103 (85.8)
Cerebral palsy/ASD	Yes	23 (19.2)
	No	97 (80.8)

^a Chronic illness: hypertension, diabetes mellitus, hyperthyroidism etc.

^b Associated co-morbidities: seizure disorder, speech and learning disorders, auditory impairment etc.

Mothers who scored 10 or more on PHQ-9 were considered as screened positive for depression and similarly those who scored four or more on GAD-7 were considered as screened positive for anxiety and were further evaluated for a lifetime diagnosis of major depression or anxiety using MINI International Neuropsychiatric Inventory (MINI-PLUS) version 7.0.2. The principal investigator was trained for a week in the department of psychiatry for administering the above tools.

2.4. Ethics approval

Study protocol was reviewed and approved by Institutional Ethics Committee for observational studies of Jawaharlal Institute of Postgraduate Medical Education and Research, India (JIP/IEC/2019/0313). The purpose of the study was explained to the mothers and informed consent was obtained before the interview. Privacy and confidentiality were ensured. Mothers diagnosed with depression and/or anxiety were referred to the department of psychiatry for further evaluation and necessary treatment was initiated.

2.5. Statistical analysis

Data analysis was done using SPSS version 17.0 and data was entered using EpiCollect5 version 1.14; a smart phone based application. Categorical variables were expressed as proportions whereas the continuous variables were expressed as mean (SD) or median (IQR) based on normality.

We summarized depression and anxiety as proportion with 95% confidence interval (CI). Association of depression and or anxiety with the socio-demographic characteristics was assessed using chi-square test and unadjusted prevalence ratio with 95% CI was calculated.

Multivariable regression analysis (log binomial model) was done by taking variables with p-value of <0.2 in unadjusted analysis into the

Fig. 1. Proportion of mothers of children with NDD diagnosed with depression, anxiety and both attending a tertiary care center, Puducherry 2019 (N = 120).

model, to identify the independent factors associated with the outcomes of the study, adjusted prevalence ratios with 95% CI were also calculated. A p-value of less than 0.05 was considered statistically significant.

3. Results

Of the 120 mothers of children with NDD included; 78 (65%) belonged to the age group of 30 years and above. Minor difference was noticed in the number of mothers belonging to nuclear 62 (51.7%) and joint families 58 (48.3%). Five (4.2%) mothers had a family history of psychiatric disorder and 93 (77.5%) had monthly family income less than 5000 INR (Table 1). Among the children, 82 (62.3%) were boys and 38 (31.7%) were females. The mean (SD) age of the children was 6.9 (3.7) years. About 66 (55.0%) of children were more than three years of age. Forty eight (40%) children had epilepsy, 32 (27%) had ADHD and

17 (14%) had intellectual disability. Cerebral palsy was seen in 14 (12%) children and ASD was found in 9 (8%) children. Seventy one (59%) children had associated co-morbidities as well (Table 1).

Of total, 53 (44.2%) mothers were screened positive for depression and 91 (75.8%) were screened positive for anxiety. On further evaluation, 46 (37.5%, 95% CI 29.2–46.4) mothers were diagnosed with depression and 52 (43.3%, 95% CI 34.7–52.3) mothers were diagnosed with anxiety. Thirty-six (30% 95% CI 22.3–38.6) mothers had both depression and anxiety (Fig. 1).

Factors associated with depression are described in Table-2. In adjusted analysis, family history of psychiatric disorder (aPR 1.9 95% CI 1.5–2.5; $p < 0.01$) and co-morbidities among children (aPR 2.5 95% CI 1.4–4.4; $p < 0.01$) were associated with depression. Table-3 shows the factors associated with anxiety. Chronic illness in mother (aPR 1.8 95% CI 1.4–2.4; $p < 0.01$) and children having attention deficit hyperactivity disorder (aPR 1.7 95% CI 1.0–2.9; $p = 0.04$) were associated with anxiety in mother. The following characteristics were associated with a diagnosis of both depression and anxiety (Table-4): family history of psychiatric disorder (aPR 1.9, 95% CI 1.5–2.5; $p = 0.06$), male gender of the child (aPR 2.0 95% CI 1.1–3.7; $p = 0.02$), co-morbidity in children. (aPR 3.4 95% CI 1.5–7.6; $p < 0.01$), children with ADHD (aPR 1.8 95% CI 1.0–3.3; $p = 0.04$), intellectual disability (aPR 2 95% CI 1.0–3.6; $p = 0.04$) and autism spectrum disorder (aPR 2.6 95% CI 1.2–5.8; $p = 0.01$).

4. Discussion

Our study sought to assess the burden of depression and anxiety amongst the mothers of children with common NDD attending a public health facility in south India. In our sample, we found high level of burden; 38% of mothers had depression, 43% had anxiety and 30% had both. The mother identified with depression and/or anxiety were informed about their mental health status and were referred to the department of psychiatry for further help. Our estimates were much higher compared to that of National Mental Health Survey 2015–16; the prevalence of depression in women of general population was 2.97%

Table 2

Association of socio-demographic and child characteristics with depression among the mothers of children with NDD attending a tertiary care center, Puducherry, 2019 (N = 120).

Characteristics	Categories	Total (N)	Depression n %	Unadjusted PR (95%CI)	Adjusted PR (95%CI)	P value [#]
Total (N)		120	46 (38.3)			
Age of mother (years)	<30	78	17 (40.5)	1.08 (0.68–1.7)	–	–
	≥30	42	29 (37.2)	1	–	–
Marital status	Married	114	44 (38.6)	1.1 (0.36–3.6)	–	–
	Widow	6	3 (33.3)	1	–	–
Family history of psychiatric disorder	Yes	5	4 (80.0)	2.1 (1.32–3.61)	2.08 (1.5–2.7)	<0.001
	No	115	42 (36.5)	1	1	–
Monthly family income (INR)	<4000	35	17 (48.6)	1.8 (0.91–3.86)	–	–
	4000–4999	31	10 (32.3)	1.2 (0.54–2.81)	–	–
	5000–10000	27	12 (44.4)	1.7 (0.79–3.69)	–	–
	>10,000	27	7 (26.0)	1	–	–
Chronic illness in mother*	Yes	11	4 (36.3)	1	–	–
	No	109	42 (38.5)	1.0 (0.46–2.39)	–	–
Gender of the child	Male	82	35 (42.7)	1.4 (0.84–2.57)	1.53 (0.89–2.63)	0.11
	Female	38	11 (29.0)	1	1	–
Associated co-morbidities in child**	Yes	71	36 (50.7)	2.4 (1.36–4.52)	2.25 (1.2–4.2)	0.01
	No	49	10 (20.4)	1	1	–
History of Epilepsy in child	Yes	48	14 (29.2)	0.65 (0.39–1.09)	0.99 (0.61–1.62)	0.99
	No	72	32 (44.4)	1	–	–
History of ADHD in child	Yes	32	15 (46.9)	1.33 (0.83–2.11)	–	–
	No	88	31 (35.2)	1	–	–
History of Intellectual disability in child	Yes	17	9 (52.9)	1.47 (0.87–2.47)	1.21 (1.1–2.34)	<0.001
	No	103	37 (35.9)	1	–	–
History of Cerebral palsy/ASD in child	Yes	23	8 (34.7)	0.88 (0.48–1.63)	–	–
	No	97	38 (39.1)	1	–	–

Adjusted analysis included family history of psychiatric disorder, gender of the child and associated co-morbidities in the child.

*Chronic illness: hypertension, diabetes mellitus, hyperthyroidism etc.

**Associated co-morbidities: seizure disorder, speech and learning disorders, auditory impairment etc.

#P-value of adjusted analysis.

Table 3

Association of socio-demographic and child characteristics with anxiety among the mothers of children with NDD attending a tertiary care center, Puducherry, 2019 (N = 120).

Characteristics	Categories	Total (N)	Anxiety (n %)	Unadjusted PR (95%CI)	Adjusted PR (95%CI)	P value [#]
Total (N)		120	52 (43.3)		–	–
Age of mother (years)	<30	78	19 (45.2)	1.1 (0.70–1.63)	–	–
	≥30	42	33 (42.3)	1	–	–
Marital status	Married	114	4 (66.7)	1.6 (0.86–2.90)	–	–
	Widow	6	48 (42.1)	1	–	–
Family history of psychiatric disorder	Yes	5	3 (60.0)	1.4 (0.66–2.98)	–	–
	No	115	49 (42.6)	1	–	–
Monthly family income (INR)	<4000	35	18 (51.4)	1.2 (0.72–2.20)	–	–
	4000–4999	31	9 (29.0)	0.7 (0.35–1.45)	–	–
	5000–10000	27	14 (51.8)	1.2 (0.71–2.27)	–	–
	>10,000	27	11 (40.7)	1	–	–
Chronic illness in mother*	Yes	11	7 (63.6)	1.5 (0.94–2.54)	1.75 (1.3–2.3)	0.00
	No	109	45 (41.3)	1	1	–
Gender of the child	Male	82	37 (45.1)	1.1 (0.72–1.81)	–	–
	Female	38	15 (39.5)	1	–	–
Associated co-morbidities in child**	Yes	71	38 (53.5)	1.9 (1.14–3.06)	1.4 (0.8–2.4)	0.13
	No	49	14 (28.6)	1	1	–
History of Epilepsy in child	Yes	48	15 (31.2)	0.60 (0.37–0.97)	0.78 (0.42–1.46)	0.45
	No	72	37 (51.4)	1	1	–
History of ADHD in child	Yes	32	18 (56.2)	1.45 (0.97–2.17)	1.31 (0.83–2.07)	0.23
	No	88	34 (38.6)	1	1	–
History of Intellectual disability in child	Yes	17	10 (58.8)	1.44 (0.90–2.28)	1.07 (.61–1.86)	0.80
	No	103	42 (40.7)	1	1	–
History of Cerebral palsy/ASD in child	Yes	23	9 (39.1)	0.88 (0.50–1.53)	–	–
	No	97	43 (44.3)	1	–	–

NDD – Neuro-developmental disorder, INR- Indian National Rupees, ASD-autism spectrum disorder, ADHD-attention deficit hyperactivity disorder.

Adjusted analysis included chronic illness in mother, associated co-morbidities in the child and NDD in child.

*Chronic illness: hypertension, diabetes mellitus, hyperthyroidism etc.

**Associated co-morbidities: seizure disorder, speech and learning disorders, auditory impairment etc.

#P-value of adjusted analysis.

Table 4

Association of socio-demographic and child characteristics with both depression and anxiety among the mothers of children with NDD attending a tertiary care center, Puducherry, 2019 (N = 120).

Characteristics	Categories	Total (N)	Both depression and anxiety n %	Unadjusted PR (95%CI)	Adjusted PR (95%CI)	P value [#]
Total (N)		120	36 (30.0)		–	–
Age of mother (years)	<30	78	14 (33.3)	1.2 (0.67–2.06)	–	–
	≥30	42	22 (28.2)	1	–	–
Marital status	Married	114	2 (33.3)	1.1 (0.34–3.59)	–	–
	Widow	6	34 (29.8)	1	–	–
Family history of psychiatric disorder	Yes	5	3 (60.0)	2.0 (0.96–4.52)	1.7 (1.0–2.6)	0.01
	No	115	33 (28.7)	1	1	–
Monthly family income (INR)	<4000	35	12 (34.3)	1.8 (0.74–4.62)	0.3 (0.2–0.7)	0.003
	4000–4999	31	7 (22.6)	1.2 (0.44–3.40)	0.6 (0.4–0.9)	0.03
	5000–10000	27	12 (44.4)	2.4 (0.98–5.89)	0.4 (0.2–1.02)	0.058
	>10,000	27	5 (18.5)	1	1	–
Chronic illness in mother*	Yes	11	4 (36.4)	1.2 (0.54–2.85)	–	–
	No	109	32 (29.4)	1	–	–
Gender of the child	Male	82	28 (34.1)	1.6 (0.82–3.21)	2.1 (1.1–3.7)	0.02
	Female	38	8 (21.0)	1	1	–
Associated co-morbidities in child**	Yes	71	30 (42.2)	3.4 (1.55–7.65)	3.0 (1.3–6.8)	0.008
	No	49	6 (12.2)	1	1	–
History of Epilepsy in child	Yes	48	8 (16.6)	0.42 (0.21–0.85)	0.55 (0.29–1.02)	0.06
	No	72	28 (38.8)	1	1	–
History of ADHD in child	Yes	32	15 (46.9)	1.96 (1.16–3.31)	1.02 (0.87–1.1)	0.79
	No	88	21 (23.8)	1	1	–
History of Intellectual disability in child	Yes	17	7 (41.1)	1.46 (0.76–2.79)	–	–
	No	103	29 (28.1)	1	–	–
History of Cerebral palsy/ASD in child	Yes	23	6 (26.1)	0.84 (0.39–1.78)	–	–
	No	97	30 (30.9)	1	–	–

Adjusted analysis included family history of psychiatric disorder, monthly family income, gender of the child, associated co-morbidities in the child and NDD in child.

*Chronic illness: hypertension, diabetes mellitus, hyperthyroidism etc.

**Associated co-morbidities: seizure disorder, speech and learning disorders, auditory impairment etc.

#P-value of adjusted analysis.

and that of generalized anxiety was found 0.8%¹⁰(Gururaj et al., 2018). Our results are similar to a study from Tamil Nadu, India among mothers of children with cerebral palsy. A study among mothers of children with

NDD from Gujarat, India reported higher prevalence estimate of anxiety of 57% and this could be due to higher prevalence of family history of psychiatric disorders. Of all the NDDs, anxiety was found to be more

common in mothers of children having attention deficit hyperactivity disorder.⁷

Family history of psychiatric disorders is a well-known risk factor and we found this was associated with depression in mothers.⁷ Family history may have been under reported due to stigma. About three fifths of the children had co-morbidities and their mothers had significantly higher prevalence of depression. Higher the number of morbidities in child and severity of the NDDs, mothers face challenges in caring the child that may affect the emotional wellbeing leading to depression. These sub-group of mothers of children with multiple morbidities need to be identified before development of psychological morbidity.

Strengths of our study include two step assessment using validated tools by a single trained investigator for screening and diagnosis of depression and anxiety. We included children with NDD from various clinics thus broadening the spectrum of NDD. One major limitation of our study was the lack of a comparison group, however nationally representative estimates were available for comparison with general population. Generalizability of the findings is limited since the estimates were based on sample from a limited geographical region.

Literature have supported to rope in support of mothers of children with NDD to improve their mental and psychological well-being. Social work methods such as intervention techniques, counseling and group therapies can be used among the mothers of children with NDD to overcome depression and anxiety¹¹ (Sumesh et al., 2019). As early as the child gets diagnosed with NDD, mother needs to be sensitized about the psychiatric morbidities which she can develop later. Routine periodic screening for psychiatric morbidities during the follow up visits of the child can be implemented. Counseling and coping strategies can be provided to these mothers through supervised peer mentors. Non-specialist like medical officers and ANM can be trained to address the mental health needs of these mothers at the primary care level.⁸ Involvement of other family members in the standard treatment plan of the children needs to be emphasized as this adds support to the mother.

To conclude, mothers of children with NDDs have higher level of depression and anxiety compared to estimates from general population. This calls for focus on mental health needs of mothers of children with NDD and justifies the need to promote the well-being of these mothers for improving their as well as their family's quality of life.

Ethics approval

Approved by Human Institute Ethics Committee JIPMER (JIP/IEC/

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Declaration of competing interest

None.

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