

Knowledge, Attitude and Perception about Neurodevelopmental Disorders among Pregnant Women: A Cross-sectional Study

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ABSTRACT

Introduction: Neurological Developmental Disorders (NDD) reflect disruptions of neuroanatomic structure or psychophysiological function and place a child at-risk for developmental, cognitive, emotional, behavioural, psychosocial and adaptive challenges. The common NDD are Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), tics disorder, intellectual disabilities, Specific Learning Disorders (SLD), motor disorders and communication disorders. The purpose of the study was in agreement with the literature overviewed, which suggests, the prevalence of NDD is high in children. Complications that happen during the antenatal or perinatal period, and the awareness of the same in pregnant women is significantly low.

Aim: To know about the knowledge, attitude and perception of NDD among pregnant women.

Materials and Methods: This cross-sectional study was conducted at Dr. D.Y. Patil College of Physiotherapy, Pimpri, Pune from September 2020 to February 2021 on pregnant women with informed and voluntary consent. A total of 200 primigravida women were included and women with complicated pregnancy were excluded.

A self-constructed questionnaire was prepared and administered. It had three domains of total 21 items- the knowledge domain with eight questions, the attitude domain with seven questions and the perception domain with six questions. Descriptive statistics were used to analyse the results.

Results: Total 200 women were included, mean age was 25.6±2 years. A 24% of the women had heard about the term NDD and only 13% of them knew its meaning. Attitude of pregnant women, where 79.5% were aware about infections, use of drugs and alcohol and smoking during pregnancy can lead to harmful effects on the foetus. Perception of NDD, where 84% women believed that good health of the mother during pregnancy can prevent NDD, 91.5% believed that a proper diet and nutrition during pregnancy plays a role in prevention.

Conclusion: The study concluded that, only 24% have ever heard of the term NDD and only 13% were aware of the meaning of it. While 79% of the pregnant women knew about the importance of antenatal care, significantly less pregnant women had knowledge about NDD and only few of them were aware about the possible signs of NDD.

Keywords: Autism, Awareness, Cerebral palsy, Learning disorder

INTRODUCTION

Neurodevelopment is an apparent relation between genetic, neurological and behavioural processes across the developmental lifespan. Any disturbance in this process by any internal or external factors will have risk of neurodevelopmental disorders and disability [1]. Neurological developmental dysfunctions reflect disruptions of neuroanatomic structure or psychophysiological function and place a child at-risk for developmental, cognitive, emotional, behavioural, psychosocial and adaptive challenges. The common NDDs are ADHD, ASD, tics disorder, intellectual disabilities, SLD, motor disorders and communication disorders [2].

The SLD is a neurodevelopmental disorder that impedes the ability to learn or use specific academic skills (e.g., reading, writing and arithmetic), which is the foundation of other academic learning [3]. Prevalence of specific learning disability in India ranges from 5%-15%. Lack of awareness among parents and school teachers continue to pose a significant issue [4,5]. The above study concluded that SLD is highly prevalent and remains undiagnosed due to lack of awareness among teachers and parents [6]. Cerebral Palsy (CP) describes a group of permanent disorders of the development of movement and posture causing activity limitations. It excludes motor disorders of spinal, peripheral nerve, muscular or mechanical origin [7].

Pregnancy is a period during which a foetus develops inside a woman's womb or uterus. It's divided into three trimesters. Trimester 1 lasting for first 12 weeks, trimester 2 from 13th to 28th week and the last trimester from 29th to 40th week. Each trimester has those problems which can cause NDD. Hyperemesis gravidarum, which is commonly observed in first trimester is a severe type of vomiting which has got deleterious effect on the health of mother and might even lead to problems in carrying day to day life [8,9]. Other condition like pre-eclampsia which is a multisystem disorder of unknown aetiology characterised by development of hypertension to extent of 140/90 mmHg or more with proteinuria after the 20th week in a previously normotensive and non proteinuric woman [10]. Study by Pariente G et al., reported that women with pre-eclampsia have increased levels of inflammatory cytokines (IL-6, IL-12) which cause structural and functional changes in the endothelial cells [11].

Prelabour Rupture of the Membranes (PROM) is the spontaneous ruptures of membranes any time beyond 28th week of pregnancy [12,13]. Before the onset of labour and the foetal inflammation associated with it has an adverse effect on brain development, thus, increasing the NDD outcome in children [8, 14]. If the mother received two tetanus doses in last pregnancy and mother gets pregnant again within three years than only one dose is recommended and is called as booster dose. Others are Hepatitis B vaccine, Influenza vaccine, Hepatitis A vaccine [15]. The purpose of the study, in agreement

with the literature overviewed (D'Alessandro A), which suggests, the prevalence of NDD is high occurring, due to complications that happen during the antenatal or perinatal period, and the awareness of the same in pregnant women is significantly low, hence the study's objective is to know about the attitude, knowledge and perception of NDD among pregnant women [16].

In accordance with the increased prevalence of various prior literatures, the need for the awareness of neurological disabilities in pregnant women is necessary due to the increased mortality and morbidity of neonatal infants due to the either negligence or prior precautions taken. Due to this reason, it is essential to increase the knowledge of the infections such as TORCH (Toxoplasma gondii; Other agents, such as syphilis, parvovirus B19, varicella zoster virus, and listeria; Rubella; Cytomegalovirus, Herpes simplex virus-2) infection and pregnancy complications such as neonatal jaundice, preterm delivery, pre-eclampsia, hyperemesis gravidum, miscarriage, placental previa and other deficits to reduce the incidence of a NDD. Through dedicated diagnostics and regular prenatal and postnatal follow-up and to adapt to the necessary precautions given by the healthcare workers, it can help improve the awareness of NDD during their childbearing ages and of the various complications during the trimesters of their pregnancy [17].

Hence, the present study was conducted to find out the attitude, knowledge and perception of NDD among pregnant women.

MATERIALS AND METHODS

This cross-sectional study was conducted at Dr. D.Y. Patil College of Physiotherapy, Medical College and Research Centre, Pimpri, Pune, Maharashtra, India, from September 2020 to February 2021. A written informed consent for voluntary participation in the study was taken and study was initiated after receiving the Institutional ethical clearance. (Institutional Ethical Clearance (Number-DYPCPT/ISEC/09/2021).

Inclusion criteria: Women from first, second and third trimester with conception having single or multiple parity, with educational status of Secondary School Certificate (SSC) and age group from 21 to 30-year-old were included in the study.

Exclusion criteria: Those women who were unwilling to participate in the study, mother diagnosed with psychological illness, mother diagnosed with other cognitive and behavioural illness and those with prolonged medical illness including Human Immunodeficiency Virus (HIV), Tuberculosis (TB) and Systemic Lupus Erythematosus (SLE) were excluded.

Sample size calculation: Sample size calculation was done using WinPIPE Software version 11.34, Confidence interval and mean of previous study by Serena J Counsell, was used to estimate the sample size [13]:

Formula for sample size calculation: $N = z^2 pq / e^2$

Where, N=Sample size; z=Confidence interval at 95% (Standard value on 1.96) pq=Variance of population (0.05); e=Allowable error (5%)

Sample size calculated using above formula was formulated as 200.

Questionnaire

Demographic data (age, gravida, parity) was obtained from all the participants.

The study parameters included knowledge, attitude and perception about NDD in pregnant women and to assess this, a 21-Item self-constructed questionnaire was made. This questionnaire was constructed by authors themselves with help of experts in the field of community rehabilitation physiotherapy. Internal validity and reliability ($r=0.8$) was assessed and it was administered to the participants included in the study.

The questionnaire was then divided into three domains:

Knowledge domain: is defined as ability of knowing and recognising various disorders as risk factors during pregnancy. It has eight questions addressing on awareness of importance of antenatal check-ups and vaccinations, the impact of injuries during delivery which can lead to mental adversities in children, speech difficulty and physical disability including CP.

Attitude domain: is defined as understanding of various risk factors of neurodevelopmental disorders. It includes seven questions regarding understanding pregnancy related complications and risk factors leading to neurodevelopmental disorders. The questions were framed to understand, if the pregnant females were aware about the which leading to neurodevelopmental disorder, including hypertension, infections, pregnancy induced diabetes, thyroid.

Perception domain: is defined by considering preventive steps to avoid such events during pregnancy. It has six questions which evaluates the application of knowledge into preventing the adverse events during pregnancy so as to avoid further occurrence of neurodevelopmental disorders. The questions in this domain are focused on preventive measure for developmental disorders which includes intake of vitamin B12 during pregnancy, counselling, and adequate nutrition during pregnancy.

Interpretation: The questionnaire had a subjective scoring system as Yes or No.

STATISTICAL ANALYSIS

Descriptive statistics were reported and frequency distribution in terms of percentages was reported. The data was analysed using WinPipe software version 11.34.

RESULTS

Total 200 women were included in present study. The mean age was 25.6 ± 2 years, minimum age being 21 and maximum being 27. Distribution of education which indicates that 57% of the women were Higher Secondary Certificate (HSC) pass, 26.5% were Senior Secondary Certificate (SSC) and 16.5% were graduate, number of times females got pregnant 50% conceived for the first time, 33.5% conceived for the second time and 13.5% conceived for the 3rd time and distribution of pregnant females by their trimester and it can be seen that 42.5% of the females were in their 3rd trimester, 41.5% were in their second and 16.00% in their first trimester [Table/Fig-1].

Variable	Subgroups	n (%)
Age group (Years)	21-22	58 (29%)
	23-24	100 (50%)
	25-26	34 (17%)
	27	8 (4%)
Level of education	SSC	53 (26.5%)
	HSC	114 (57%)
	Graduation	33 (16.5%)
Number of conception	First conception	100 (50%)
	Second conception	67 (33.5%)
	Third conception	27 (13.5%)
	Fourth conception	5 (2%)
	Fifth conception	1 (0.5%)
Trimester	First	32 (16%)
	Second	83 (41.5%)
	Third	85 (42.5%)

[Table/Fig-1]: Distribution of age, level of education, number of conception, trimesters. SSC: Senior secondary certificate ; HSC: Higher secondary certificate

[Table/Fig-2] represents the knowledge about NDD, 79% of the women were familiar with the importance of antenatal care during pregnancy, 41.00% were aware about the impact of injuries during

Question no.	Question	Response (Yes)	Response (No) n (%)
Knowledge domain			
1	Have you ever heard of the term "neurological developmental disabilities"?	48 (24%)	152 (76%)
2	Do you know what does "neurodevelopmental disabilities mean"?	26 (13%)	174 (87%)
3	Are you aware about the importance of antenatal check-ups and vaccinations to be taken during pregnancy?	158 (79%)	42 (21%)
4	Are you aware about the impact of injuries during delivery which can lead to mental adversities in children?	82 (41%)	118 (59%)
5	Have you ever seen a child with any type of neurological developmental disabilities?	88 (44%)	112 (56%)
6	Do you know that if a child has difficulty in speaking or is unable to speak till the age of 7 months, he/she may be suffering from some type of neurological developmental disabilities?	43 (21.50%)	157 (78.5%)
7	Do you know that difficulty in walking and inability to stand independently till the age of 15 months, can be a condition of physical disability called cerebral palsy (CP)?	47 (23.50%)	153 (76.5%)
8	Are you aware that if a child is not making eye contact, there is a need for medical consultation?	86 (43%)	114 (57%)
Attitude domain			
9	Are you aware that TORCH or any other infections during pregnancy, use of drugs, alcohol and smoking can lead to harmful effects on children?	153 (76.50%)	47 (23.5%)
10	Are you aware that increase in blood pressure (hypertension)/ diabetes mellitus/ thyroid disorders if not treated during pregnancy leads to Neurological Developmental Disabilities?	120 (60%)	80 (40%)
11	Are you aware that pregnancy at an older age, is a risk factor for neurological developmental disabilities in children?	73 (36.50%)	127 (63.50%)
12	Are you aware that delay in crying of a child after birth can lead to neurological developmental disabilities?	64 (32%)	136 (68%)
13	Are you aware that early birth of a child can lead to neurological developmental disabilities?	62 (31%)	138 (69%)
14	Are you aware that if a child is unable to hold their neck and sit even after 6 months, is a sign of neurological developmental disabilities?	59 (29.5%)	141 (70.5%)
15	Are you aware that if a child is either lethargic or hyperactive all the time, he/ she may be suffering from neurological developmental disabilities?	41 (20.50%)	159 (79.5%)
Perception domain			
16	Do you believe that good health of the mother during pregnancy period can help to prevent Neurological developmental disabilities?	168 (84%)	32 (16%)
17	Do you believe that proper diet and nutrition can help prevent Neurological developmental disabilities?	183 (91.50%)	17 (8.50%)
18	Do you believe that detection of early symptoms can help prevent neurological developmental disabilities?	123 (61.50%)	77 (38.50%)
19	Do you believe parent counselling is important to help prevent neurological developmental disabilities?	112 (56%)	88 (44%)
20	Do you believe that deficiency of vitamin B12, folic acid during pregnancy can lead to neurodevelopmental disorders?	95 (47.50%)	105 (52.50%)
21	Do you believe that early diagnosis of accurate type of neurological developmental disabilities can help in betterment of child?	123 (61.50%)	77 (38.50%)

[Table/Fig-2]: Knowledge, attitude and perception about neurodevelopmental disorders in pregnant women.

delivery and its adversities on the foetus, 44% have seen a child with a NDD and 43% are aware that if a child does not make eye contact, there is need for medical consultation.

DISCUSSION

The current study was conducted on 200 pregnant women to assess the knowledge, attitude and perception of NDD among pregnant women from the antenatal care, where a self-constructed questionnaire consisting of 21 questions divided among the domains of knowledge, attitude and perception was circulated. During the study, pregnant women from age 21 to 30 self-attested the questionnaire. A 57% of them were of HSC qualification and 42.5% being in their third trimester. When it comes to knowledge about NDD, in Sharma P et al., suggested that there is a need to increase the level of awareness regarding the knowledge about vaccinations [3].

In the current study, women showed highest understanding about the significance of antenatal check-up and vaccinations to be taken during pregnancy and 44.5% pregnant women have seen a child with a type of NDD, whereas a significant number of pregnant women did not know the meaning of NDD and the symptoms associated with the same. A previous study by (Kliegmen RM and St. Geme J) [2] showed a lack of awareness and recognition of autism.

The current study supports the previously mentioned study as it indicates lower level of knowledge regarding the signs and symptoms of autism [5]. While assessing attitude of pregnant women towards NDD in the current study, about 76% of pregnant women have shown awareness about the various infections, use of drugs and alcohol and smoking during pregnancy have harmful effects on the foetus [6]. About 60% of pregnant women showed high level of awareness about the co-morbidities such as diabetes mellitus, thyroid and hypertension during pregnancy and their adverse effects on the foetus and merely 36.5% of pregnant women were aware about the risk of pregnancy at an older age and as low as 20% and 29.5% of pregnant women were aware regarding the signs and symptoms of CP and ADHD, respectively [7,8].

The final domain that was assessed after knowledge and attitude was perception, 91.5% of pregnant women believed that proper diet and nutrition is helpful in prevention of NDD which indicates that healthier food choices can improve foetal and maternal health leading to reduction of long term complications in Maher GM et al., [10]. An 86% of pregnant women believed that good health of the mother throughout the pregnancy helps in prevention of adversities on the foetus. A 61.5% of pregnant women have perceived that apprehension of early symptoms can help avert the likelihood of NDD. Scarcely, 47.5% of women believe the deficiency of folic acid and vitamin B12 can be a harmful aspect leading to NDD, in an antecedent literature it concluded that folic acid is believed as a vitamin supplement but not consumed compulsorily during the peri-conceptional period. About 56% of pregnant women failed to perceive the magnitude of parent counselling in order to prevent NDD [10].

Limitation(s)

Limitations of the present study was small sample size and inter and intra-reliability of the questionnaire was not assessed.

CONCLUSION(S)

Incorporating antenatal education has shown to impact on possible NDD. Given the limited scope of expansion of present study, findings may still be useful for clinical educators to conceptualise such educational programs for the benefit of community at large. The present study also concludes that women were not aware about risk factors of neurodevelopmental disorders. Future studies with larger sample size can be conducted for better outcome.

REFERENCES

- [1] Arora NK, Nair MKC, Gulati S, Deshmukh V, Mohapatra A, Mishra D, et al. Neurodevelopmental disorders in children aged 2-9 years: Population-based burden estimates across five regions in India. *PLoS Med*. 2018;15(7):e1002615.
- [2] Kliegman RM, St. Geme J. Nelson Textbook of Pediatrics 2-Volume Set, 21st Edition. 19 Apr 2019.
- [3] Sharma P, Gupta R, Banal R, Majeed M, Kumari R, Langer B, et al. Prevalence and correlates of Attention Deficit Hyperactive Disorder (ADHD) risk factors among school children in a rural area of North India. *J Fam Med Prim Care*. 2020;9(1):115-18.
- [4] Qiu S, Lu Y, Li Y, Shi J, Cui H, Gu Y, et al. Prevalence of autism spectrum disorder in Asia: A systematic review and meta-analysis. *Psychiatry Res*. 2020;284:112679. Doi: 10.1016/j.psychres.2019.112679.
- [5] Muthusamy K, Sahu JK. Specific Learning Disability in India: Challenges and Opportunities. *Indian Journal of Pediatrics*. 2020;87:91-92; <https://doi.org/10.1007/s12098-019-03159-0>.
- [6] Chordia SL, Thandapani K, Arunagirinathan A. Children 'At Risk' of Developing Specific Learning Disability in Primary Schools. *Indian J Pediatr*. 2020;87(2):94-98.
- [7] IAP Textbook of Pediatrics. IAP Textbook of Pediatrics. 2013.
- [8] Dutta D. DC Dutta's Textbook of Obstetrics. DC Dutta's Textbook of Obstetrics. 2015.
- [9] Fejzo MS, Magtira A, Schoenberg FP, Macgibbon K, Mullin PM. Neurodevelopmental delay in children exposed in utero to hyperemesis gravidarum. *Eur J Obstet Gynecol Reprod Biol*. 2015;189:79-84. Doi: 10.1016/j.ejogrb.2015.03.028. Epub 2015 Apr 2.
- [10] Maher GM, McCarthy FP, McCarthy CM, Kenny LC, Kearney PM, Khashan AS, et al. A perspective on pre-eclampsia and neurodevelopmental outcomes in the offspring: Does maternal inflammation play a role? *Int J Dev Neurosci*. 2019 Oct;77:69-76. Doi: 10.1016/j.ijdevneu.2018.10.004. Epub 2018 Nov 2.
- [11] Pariente G, Wainstock T, Landao D, Sheiner E, Walfisch A. Preterm placental abruption and long term neurological morbidity of the offspring. *Paediatr Perinat Epidemiol*. 2019; 33(3):215-22. Doi: 10.1111/ppe.12553.
- [12] Pariente G, Wainstock T, Walfisch A, Landau D, Sheiner E. Pediatric and perinatal Epidemiology, Placental abruption and long term neurological hospitalizations in the offspring. 2019;33(3):215-22. Doi: 10.1111/ppe.12553.
- [13] Serena J, Counsell et al, 2008, Brain journal of neurology, Specific relations between neurodevelopmental abilities and white matter microstructure in children born pre-term. 2008:131(12);3201-08.
- [14] Jennifer AW, Donnelly M, Miriam D, Marilyn J, Johnson M, Virginia DW et al. Inflammatory predictors of neurologic disability after preterm premature rupture of membranes, 212(2), 212.e1-212.e9.
- [15] Verma R, Khanna P, Dhankarb M. Vaccination during pregnancy: Today's need in India. *Hum Vaccin Immunother*. 2016;12(3):668-70.
- [16] D'Alessandro A, Napolitano F, D'Ambrosio A, Angelillo I. Vaccination knowledge and acceptability among pregnant women in Italy. *Hum Vaccin Immunother*. 2018;14(7):1573-79.
- [17] Blondin J, LoGiudice J. Pregnant women's knowledge and awareness of nutrition. *Appl Nurs Res*. 2018; 39:167-174. Doi: 10.1016/j.apnr.2017.11.020. Epub 2017 Nov 7.

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