IOSR Journal of Computer Engineering (IOSR-JCE)
e-ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 23, Issue 2, Ser. I (Mar. – Apr. 2021), PP 42-46
www.iosrjournals.org

A Comparative Study on Postpartum Depression and Quality of Life in Women association with Data Mining Techniques

Priyanka Mazumder[1], Dr. Siddhartha Baruah[2]
[1](Research Scholar, Department of Computer Applications, Jorhat Engineering College, Jorhat, Assam, India)
[2](Professor, Department of Computer Applications, Jorhat Engineering College, Jorhat, Assam, India)

Abstract: *Postnatal Depression is a serious problem found silently in our society which affects a large amount of women. The awareness and diagnosis of postnatal depression is very less concern for the patients after delivery. Data mining techniques can help to diagnosis the probable conditions of patients suffering from Postnatal Blues, postnatal Depression or postnatal psychosis. Data mining is known for its techniques and predictive solution for early detection of postpartum depression. Mostly widely techniques are Random Forest, C4.5, Support Vector Machine and many more.*

Date of Submission: 07-03-2021 Date of Acceptance: 20-03-2021

I. Introduction

Depression is one of the most concern topics in today's busy life. Women are between 2 to 3 times more likely to experience depression and anxiety than men [1]. Women are seen sometime to be most vulnerable in association case of postpartum depression. Postpartum Depression (PPD) is the major mental health disorder found in women during first year after child birth. PPD is also cause of increasing serious mood disorder in women which may last more than year and even lifetime. PPD has mainly three forms- the Blues (Baby Blues, Maternity Blues), postpartum depression or postnatal depression and puerperal (postpartum or postnatal psychosis). These three has different characteristics and affect women immediate after child birth.

Postpartum Blues is the common mood disorder in women found immediate within a few days of delivery. Postpartum Blues last for a week and are mild compare to other categories of depression. Upto 20% of women with blues will go on to develop major depression in the first year. According to WHO report, nearly 30-75% of women globally affected by Postpartum Blues. Postpartum Depression is the main concern of this paper. 10-15% women globally are effected by PPD. It is one of the most common complications found in women after child birth. Postpartum depression is major concern topic of this paper. It is one of the most unique forms of depression and frequently unrecognized. Globally PPD is affecting a major community especially in developing country, where the range and percentage is always higher. These developing depression need awareness and immediate concern of society for its control. Puerperal or postpartum psychosis is uncommon yet severe form of depression. It generally occurs in 1-2 women per 1000 deliveries with globally 0.1-0.2% women. It is characterized with presence of psychotic features in women. Many research shows that puerperal psychosis is biological and genetic in nature.

There are many factors that lead postpartum depression in women after delivery. Women after immediate delivery suffers from major change in progesterone level which remain too high during pregnancy. Many research also concluded that these fluctuate of progesterone level plays vital role in women to suffer from postpartum depressions. Women after delivery at risk of depression becomes irresponsible, sad, hopeless, and empty and many emotional breakdown conditions can be seen which the paper will try to highlight. In some extreme cases mothers might even harm herself or her baby too. It is very much important to treat, diagnosis and prevent women from PPD. In many developing countries PPD screening after delivery is compulsory to check either she has PPD symptoms or not. In India, many cases are unrecognized and the topic PPD is not acknowledged to women. There are many research which shows that women in India diagnosis PPD symptoms at extreme stages.

PPD usually begins within 1-12month after delivery. Some of the common characteristics of PPD is fearfulness, dependency, emotional liability, feelings of guilt, loss of appetite, sleep disturbance, quality of life, financial intuition, social life as well as feelings of being inadequate and unable to cope with infants, poor concentration and memory, fatigue and irritability etc.

II. Data mining and PPD

Data mining is always used to predict the hidden pattern using statistical analysis. Data mining technique will allow creating or developing a predictive model that will be associated with understanding the chance of any patients who may suffer from PPD. The data analysis can be done either by patients past records and present conditions. The major role in developing a predictive model is to select the well form of attributes and its associated value. The selection of training data will help you to test any result that may have chance of PPD or not. Data mining provide many techniques that predict the future probability to have PPD or not. Some of the common techniques that are used in research are as follows:-

Sl No.	Data Mining Techniques	Author
1.	Decision Tree C4.5	Aris Supriyanto et al. 2018[2]
2.	Random Forest Stochastic Gradient Boosting Support Vector Machines (SVM) Recursive Partitioning and Regression Trees Naïve Bayes K Nearest Neighbor Logistic Regression Neural Network	Dayeon et al. (2020) [3]
3.	C4.5 Simple Tree Linear SVM Weighted K Nearest Neighbor Bagged tree Random forest	Mei Cai et al. (2019) [4]
4.	Ensemble Classifier	Mario (2019) [5]

Table1: The associated data mining algorithm used by researcher to developed predictive model

III. Objective

The objective of this paper is to find the research and methodology that can be built to provide an effective data model to predict the PPD among women. Some of the relevant important aspects are as follows:-

1. The paper is motivated with the background research where data mining techniques can be developed or improved to provide a predictive model for early detection of PPD.
2. The paper tried to put the work of researchers and their associated variable that make a women affected in PPD.
3. The literature study is thoroughly maintained to understand the effect and quality of life that can improve the condition of PPD.

IV. Literature Review

Literature review is one of the major concerns of this paper many research journal and associated work have been reviewed to understand the condition and associated attribute to predict or develop a model where early detection of PPD can be maintained. Some of the finite works are discussed below:-

1. Vanishree Shriraam et al[1] tried to study PPD by taking the survey of 365 postpartum depressed women. The study was conducted as a population based cross-sectional study in rural population served by primary health centre. The author concluded with the aspects that the women with prevalence of depression among post partum women is quite high and the health seeking for depression is very low. The Edinburgh Postnatal Depression Scale (EPDS) has been used to predict the depression among women.
2. Aris Supriyanto et al [2] developed an online information system that can identify the level of depression more quickly and precisely. The author considered C4.5algorithm techniques to develop the predictive system. 50women examination sample was taken and the result shows 62% prevelance, 65.62% sensitive, specificity 77.77%, negative predictive value is given by 56% and positive predictive value is 84%. The author used EPDS scale to predict the depression scale in women.
3. Dayeon Shin et at. [3] developed Pregnancy Risk Assessment Monitoring System (PRAMS) using nine data mining algorithms and techniques they are – Random Forest, Stochastic Gradient Boosting, Support Vector Machines(SVM), Recursive Partitioning and Regression trees, Naïve Bayes, K Nearest Neighbour, Logistic Regression and Neural Network. As of total 72,540 women data has been included in the PRAMS among which 28,755 data has been removed due to missing value attributes. The selection of 10 fold cross validation is being used to generate the relevant analysis. The author specified with some conclusions like women without postpartum depression were more likely to have

greater education(42.6%). They were more likely to be non smokers (86.5%), married (70%) and did not have depression before pregnancy (92.2%). Women with post partum depression were more likely to have less education (42.3%) and had depression before pregnancy (23.7%).

4. Mei Cai et al.[4] developed a Post partum Depression Screening Scale by taking consider 586 sample collected from a country in North Carolina from 2002 to 2005. The author used C4.5 algorithm to develop the predictive sample. To compare the predictive model WEKA toolkit has been used. The author listed seven dimensions which can be assumed for post partum depression they are – Sleeping/Eating Disturbances, Anxiety/Insecurity, Emotional Liability, Cognitive Impairment, Loss of Self, Guilt/Shame and Contemplating Harming Oneself.
5. Zohreh Sadat et al [6] tried to put the factor of postpartum depression using the attribute selection of women associated with Quality of Life. The author considered to predictive decision model one is EPDS and other is Quality of Life (QOL). QOL has 36 questionnaires. The author analysed data using techniques Correlation between scores of EPDS and score of QOL dimensions. Other statistical analysis like Student's t-test, Mann-Whitney U Test, ANOVA, Kruskal Wallis, Chi-Square test, Pair test, Wilcoxon, Pearson and Spearman Correlation Coefficient. The author concluded with the finding that postpartum depression leads to a lower life of quality at second and fourth months. Integration of PPD screening into routine postnatal care is recommended by the author.

V. Edinburgh Postnatal Depression Scale Scoring

Edingurgh Postnatal Depression Scale [7] was developed to assist health professionals in detecting mother suffering from PPD. The scale consists of 10 short statements. A mother checks off one of the four possible answers that is closest to how she has felt during the past week. Most mothers easily complete the scale in less than five minutes. Responses are scored 0, 1, 2 and 3 based on the seriousness of the symptoms. Item 3, 5 to 10 questions are reversed score i.e. 3, 2, 1 and 0.

Mother scoring above 12 or 13 is likely to be suffering from depression and should seek medical attention. A careful clinical evaluation by a health care professional is needed to confirm a diagnosis and professional is needed to confirm a diagnosis and establish a treatment plan. The scale indicates how the mother felt during the previous week, and it may be useful to repeat the scale after two weeks.

VI. Attribute Selection

Attribute Selection is based on three tables, the first table describe the general or maternal attribute depending upon the demographic, the second table show all the general attribute that can be considered to predict a model for PPD and last table indicate the average level of attribute that impacts Quality of life of women.

Attributes (Based on Maternal Demographic)	Associated value
1. Maternal Age	19 to 40 years, (19-20, 21-29, 30-40)
2. Maternal race or Ethnicity	Based on Demographic attribute.
3. Maternal Education	0-12 years,13-15years,>=16years
4. Marital Status	Married, Divorced etc
5. Number of previous live birth	0,1,>=2
6. Depression before Pregnancy	No, Yes
7. Smoking tendency	Nonsmoker, Smoker

Table 2: Attribute Selection based on Maternal Demographic

Attributes (Most Contributive in Research)	Values
1. Breastfeeding	Weeks/Months
2. Stress Level	Low, high, medium
3. Income	High, low, medium
4. Residence Location	Rural, urban, semi rural, semi urban
5. Abortion Attemp	Yes, no
6. No of month after delivery	Month -0 to 12
7. No of family member	<5 or >5
8. Mode of delivery	Caesarian or Normal
9. Sex of born child	Male, female
10. Iron Intake during pregnancy	Yes, no
11. Anemia	Yes, no

12. Anxiety	High, low, medium
13. Doctor's Intervention during pregnancy	Yes, no
14. Delivery Hospital	State or private
15. Occupational Status	Employed or Housewife
16. Unplanned Pregnancy	Yes, no
17. Blood Pressure Level	Low, high
18. Pulse	Low, high, medium
19. Respiration	Low, normal, high, very high

Table 3: Most Contributive Attribute that decides in predicting PPD

Attributes (Quality of Life)	**Description**
Physical health	
1. Physical Functioning	Overall pregnancy health maintenance from past 1 year
2. Physical Role	How much activity or work can be done during pregnancy.
3. Bodily Pain	How often body pain affected during pregnancy
4. General Health	Record based on medical consult during pregnancy
Mental Health	
1. Social Functioning	Relationship with family and friends.
2. Emotional well being	Emotional status of mother from being pregnant to after delivery
3. Relationship with baby	Attachment concern of mother and baby

Table 4: Suggestive Attribute which affects the Quality of life of women after and during pregnancy

VII. Conclusion

The development of the predictive model is most concern study depending upon the rise of the conditions among women. In India many women are aware and maintained no health perspective regarding postpartum depression. There must be a predictive application that can help to maintain and give a probable solution on postpartum depression. The depression in our society must handle with proper consultation and support from healthcare unit. Many research shows that at extreme stage the women are being taken for treatment which becomes tough to give proper recovery. The effect of suffering from postpartum depression depends highly on socio economic background. The research also shows that postpartum depression can be tackle with support from family and proper intervention of doctor. In future study the topic will be extended to develop a predictive model to give urgent consult to patients suffering from postnatal depression.

References

[1]. Vanishee Shriraam, Pankaj Badamilai Shah, Anitha Rani M.,B.W.C. Sathiyasekaran, A Community based Study of Postpartum Depression in Rural Southern India, July 26

[2]. Aris Supriyanto,Suryono Suryono, Jatmiko Endro Susesno,Implementation Data Mining using Decision Tree Method-Algorithm C4.5 for Postpartum Depression Diagnosis, 2018, E3S Web of Conferences 73,12012

[3]. Dayeon Shin,Kyung ju Lee,Temidayo Adeluwa and Junguk Hur, Machine Learning Based Predictive Modeling of postpartum depression, Journal of Clinical Medicine, 22 August

[4]. Mei Cai, Yiming Wang, Qian Luo and Guo Wei, Factor Analysis of the Prediction of the Postpartum Depression Screening Scale, International Journal of Environmental Research and Public Health,2019

[5]. Mário W.L. Moreira , Joel J.P.C. Rodrigues , Neeraj Kumar , Kashif Saleem , Igor V. Illin, Postpartum Depression Prediction through Pregnancy Data Analysis for Emotion-aware Smart Systems

[6]. Zohreh Sadat, Masoumeh Abedzadeh Kalahroudi,Mahboobeh Kafaei Atrian, Zahra Karimian, Zahra Sooki,The impact of Postpartum Depression on Quality of Life in Women After Child's Birth, 2014,14995

[7]. Cox, J.L., Holden, J.M., and Sagovsky, R. 1987. Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry* 150:782-786

[8]. K. L. Wisner, B. L. Parry, C. M. Piontek, Postpartum Depression N Engl J Med vol. 347, No 3, July 18, 2002, 194-199

[9]. T. Titchkosky, K. Aubrecht WHO's MIND, whose future? Mental health projects as colonial logics Social Identities, 21 (1) (2015), pp. 69-84,

[10]. G. Demirel, G. Egri, B. Yesildag, A. Doganer,Effects of traditional practices in the postpartum period on postpartum depression Health Care for Women International, 39 (1) (2018), pp. 65-78,

[11]. A. Biaggi, S. Conroy, S. Pawlby, C.M. Pariante, Identifying the women at risk of antenatal anxiety and depression: a systematic review Journal of Affective Disorders, 191 (2016), pp. 62-77

[12]. V. Glover,Maternal depression, anxiety and stress during pregnancy and child outcome; what needs to be done, Best Practice & Research Clinical Obstetrics & Gynaecology, 28 (1) (2014), pp. 25-35

[13]. S. Brummelte, L.A. Galea,Postpartum depression: etiology, treatment and consequences for maternal care Hormones and Behavior, 77 (2016), pp. 153-166

[14]. E.S. Miller, M.R. Peri, D.R. Gossett,The association between diabetes and postpartum depression Archives of Women's Mental Health, 19 (1) (2016), pp. 183-186

[15]. M.W. O'Hara, K.L. Wisner,Perinatal mental illness: definition, description and aetiology Best Practice & Research Clinical Obstetrics & Gynaecology, 28 (1) (2014), pp. 3-12,

[16]. The World Health Report 2005. Make Every Mother and Child Count. Chapter. 4. Attending to 136 Million Births, Every Year. p. 61‑77.
[17]. Warner R, Appleby L, Whitton A, Faragher B. Demographic and obstetric risk factors for postnatal psychiatric morbidity. Br J Psychiatry 1996;168:607.
[18]. Patel V, Rodrigues M, DeSouza N. Gender, poverty, and postnatal depression: A study of mothers in Goa, India. Am J Psychiatry 2002;159:43.
[19]. Prost A, Lakshminarayana R, Nair N, Tripathy P, Copas A, Mahapatra R, *et al.* Predictors of maternal psychological distress in rural India: A cross‑sectional community‑based study. J Affect Disord 2012;138:277.
[20]. Chandran M, Tharyan P, Muliyil J, Abraham S. Postpartum depression in a cohort of women from a rural area of Tamil Nadu, India. Incidence and risk factors. Br J Psychiatry 2002;181:499‑504.