



Frequency of Antenatal Depression Among Women with Gestational Diabetes Mellitus

Meena Deep Khialani¹, Erum Majid Sheikh¹, Ayesha Abdul Sattar¹, Sheeri¹, Memoona Kashaf¹, Deepa Bai²

¹Department of Gynaecology & Obstetrics Ward 9B, Jinnah Postgraduate Medical Centre, Karachi, Pakistan

²Department of Medicine, Jinnah Postgraduate Medical Centre, Karachi, Pakistan

ARTICLE INFO

Keywords: Antenatal, depression, gestational diabetes mellitus

Correspondence to: Meena Deep Khialani, Department of Gynaecology & Obstetrics Ward 9B, Jinnah Postgraduate Medical Centre, Karachi, Pakistan.

Email: dr.meenadeepkhalani@gmail.com

Declaration

Authors' Contribution: All authors equally contributed to the study and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History

Received: 17-01-2025 Revised: 28-03-2025
Accepted: 15-04-2025 Published: 30-04-2025

ABSTRACT

Objectives: To determine frequency of antenatal depression among pregnant women with gestational diabetes mellitus (GDM). **Study Design:** Descriptive, cross-sectional study. **Settings:** Department of Obstetrics and Gynaecology, JPMC, Karachi. **Duration of study:** May 2024 to October 2024. **Methodology:** A total of 88 women in the 16–45 age range who had gestational diabetes mellitus were included. Women who had a history of neurological diseases, chronic liver illness, pre-existing diabetes, pre-eclampsia or eclampsia, or grand-multipara (more than five births beyond viability) were not included. Age (in years), week of gestation (as determined by a consultant obstetrician using a dating scan), BMI [as defined by the operational definition] in kg/m², gravida, para, family history of depression, place of residence (rural or urban), and booking status (booked or unbooked) were among the baseline characteristics that were recorded. Following that, a consultant psychiatrist used the 10-item MADRS score to evaluate each patient for the existence of prenatal depression. The scale's overall score was between 0 and 60 points. If a patient's score was greater than 12, they were diagnosed with depression. **Results:** The study's participants ranged in age from 16 to 45 years, with a mean age of 29.86 ± 5.66 years. The average gestational age was 28.96 ± 4.40 weeks. The average parity was 2.83 ± 1.10. The average BMI was 29.08 ± 3.14 kg/m². Mean MADRS score was 16.43 ± 6.75 and 25 (28.41%) of patients with GDM have antenatal depression with 52.0% have mild, 28.0% moderate and 20% having severe depression. **Conclusion:** This study concludes by emphasizing how physical and mental health are interwoven throughout pregnancy. In addition to being a metabolic disorder, gestational diabetes can make pregnant mothers more emotionally vulnerable.

INTRODUCTION

Usually developing in the second or third trimester of pregnancy¹, gestational diabetes mellitus (GDM) is a form of diabetes that is characterized by elevated blood sugar levels. Although the majority of women with gestational diabetes give birth to healthy children, it is crucial to control and keep an eye on the disease to lower the risk of complications for both the mother and the unborn child. Although the precise origin of gestational diabetes is unknown, it is thought to be caused by hormonal changes that impact insulin sensitivity throughout pregnancy.² Older age (≥ 30 years), gestational BMI growth from pre-pregnancy to 15-20 weeks of gestation, history of GDM, and thyroid disorders are some risk factors that raise the risk of GDM.³

Fetal hyperinsulinemia, abnormal fetal growth or macrosomia, postpartum type 2 diabetes mellitus, cardiovascular disease, and metabolic disruption⁴ are among the various maternal and fetal problems linked to GDM. Depression, however, is one of the GDM-related

morbidities that is frequently disregarded. According to a study, 17.7% of pregnant women with GDM had depression.⁵ Another study that looked at depression in pregnant women with GDM found that 21% of them had it.⁶ Similarly, the frequency of depression among women with GDM was shown to be much greater in contrast to both of these investigations, at 36.2%.⁷

The studies described above show that a significant percentage of pregnant women with GDM experience depression. In contrast, depressive disorders are largely ignored and underdiagnosed in resource-constrained nations like Pakistan, particularly in pregnant women. This is due to a number of factors, such as a lack of knowledge about mental health, the stigma associated with it in society, and even a lack of attention from treating doctors. In order to ascertain the prevalence of prenatal depression in pregnant women with gestational diabetes mellitus (GDM), I am undertaking this study. In addition to estimating the condition's impact, my study's findings will encourage doctors to monitor pregnant GDM patients for depression in order to enhance their quality of life.

METHODOLOGY

This descriptive cross-sectional study, which was authorized by the ethical review committee of the Department of Gynecology and Obstetrics, JPMC, Karachi, involved 88 women and ran from May 2024 to October 2025. The sample size for a single percentage will be calculated using the WHO calculator; the overall sample size was 88, with a 95% confidence level, a margin of error of 8%, and a frequency of prenatal depression of 17.7%.⁶ among pregnant women with GDM. Women in the 16–45 age range who had gestational diabetes mellitus (measured by fasting blood glucose levels after 8 hours of fasting) and oral glucose tolerance test (measured by checking blood sugar levels at 1 and 2 hours after consuming 75g of glucose) at 24–28 weeks of gestation when ≥ 1 plasma glucose value will be found at or above the following thresholds, were included: Fasting = 92 mg/dL (5.1 mmol/L), One hour 75-gram oral glucose tolerance test = 180 mg/dL (10 mmol/L), Two hour 75-gram oral glucose tolerance test = 153 mg/dL (8.5 mmol/L)). Women who had a history of neurological diseases, chronic liver illness, pre-existing diabetes, pre-eclampsia or eclampsia, or grand-multipara (more than five births beyond viability) were not included.

Age (in years), week of gestation (as determined by a consultant obstetrician using a dating scan), BMI [as defined by the operational definition] in kg/m², gravida, para, family history of depression, place of residence (rural or urban), and booking status (booked or unbooked) were among the baseline characteristics that were recorded. Following that, a consultant psychiatrist used the 10-item MADRS score to evaluate each patient for the existence of prenatal depression. The scale's overall score was between 0 and 60 points. If a patient's score was greater than 12, they were diagnosed with depression. As advised by a psychiatrist consultant, the proper intervention was given in the event that depression was detected. Every piece of information was kept private. No personal information was recorded, and patient anonymity was always guaranteed. Rather, each patient was assigned a number.

SPSS version 22 was utilized to analyze the data. The Shapiro-Wilk test was used to verify the data's normality. The mean +/- standard deviation and median (IQR) were used to display the quantitative variables (age, week of gestation, BMI, and MADRS score). Frequencies and percentages were used to display the qualitative factors (para, gravida, family history of depression, residency, booking status, and the presence and severity of depression). Age, week of pregnancy, BMI, gravida, para, family history of depression, domicile, and booking status were used to stratify the data. Following stratification, the significance test was either the Fischer exact test or the Chi-square test. Statistical significance was defined as a p-value of less than 0.05.

RESULTS

The study's participants ranged in age from 16 to 45 years, with a mean age of 29.86 ± 5.66 years. According to Table I, the majority of the patients, 48 (54.55%), were between the ages of 16 and 30 years. The average gestational age was 28.96 ± 4.40 weeks. The average parity was 2.83 ±

1.10. The average BMI was 29.08 ± 3.14 kg/m². Table 1 displays the distribution of patients by variables. Mean MADRS score was 16.43 ± 6.75. Figure 1 shows that 25 (28.41%) of patients with GDM have antenatal depression with 52.0% have mild, 28.0% moderate and 20% having severe depression (Table 2). Table 3 displays the stratification of antenatal depression in relation to covariates.

Table 1
Distribution of Variables (n=88)

Variables	Frequency	%age	
Age (years)	16-30	48	54.55
	31-45	40	45.45
Gestational age (weeks)	25-32	53	60.23
	>32	35	39.77
Gravidity	Primigravida	32	36.36
	Multigravida	56	63.64
Parity	Primiparous	38	43.18
	Multiparous	50	56.82
BMI (kg/m ²)	≤30	43	48.86
	>30	45	51.14
Residence	Rural	33	37.50
	Urban	55	62.50
Booking status	Unbooked	24	27.27
	Booked	64	72.73
Family history of depression	Yes	21	23.86
	No	67	76.14

Figure 1
Frequency of Antenatal Depression among Women with Gestational Diabetes Mellitus (n=88)

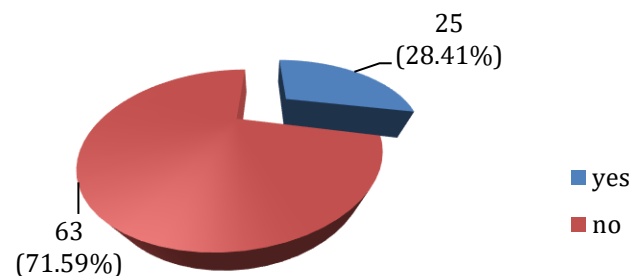


Table 2
Severity of Depression (n=25)

Severity of depression	No. of Patients	%age
Mild	13	52.0
Moderate	07	28.0
Severe	05	20.0

Table 3
Stratification of Antenatal Depression with Respect to Confounders

		Yes (n=25)	No (n=63)	P-value
Age (years)	16-30	17 (35.42%)	31 (64.58%)	0.110
	31-45	08 (20.0%)	32 (80.0%)	
Gestational age (weeks)	25-32	16 (30.19%)	37 (69.81%)	0.649
	>32	09 (25.71%)	26 (74.29%)	
Gravidity	Primigravida	13 (40.62%)	19 (59.38%)	0.055
	Multigravida	12 (21.43%)	44 (78.57%)	
Parity	Primiparous	14 (36.84%)	24 (63.16%)	0.126
	Multiparous	11 (22.0%)	39 (78.0%)	
BMI (kg/m ²)	≤30	12 (27.91%)	31 (72.09%)	0.919
	>30	13 (28.89%)	32 (71.11%)	
Residence	Rural	09 (27.27%)	24 (72.73%)	0.855
	Urban	16 (29.09%)	39 (70.91%)	
Booking status	Unbooked	14 (58.33%)	10 (41.67%)	0.0001
	Booked	11 (17.19%)	53 (82.81%)	
Family history of depression	Yes	10 (47.62%)	11 (52.38%)	0.025
	No	15 (22.39%)	52 (77.61%)	

DISCUSSION

The prevalence of prenatal depression in women with gestational diabetes mellitus was assessed in the current study. According to this study, prenatal depression affects 28.41% of patients with GDM, with mild depression accounting for 52.0%, moderate depression for 28.0%, and severe depression for 20%. These results confirm that GDM is a significant risk factor for prenatal mental disorders, as shown by similar research carried out in different parts of the world.^{8,9}

Pregnant women are considered to be especially vulnerable to mood disorders due to the physiological and mental demands of pregnancy. The additional stress of managing dietary restrictions, frequent hospital visits, glucose monitoring, insulin administration, and worry about fetal problems increases this susceptibility in women with GDM. According to research by Katon et al.¹⁰ and Kozhimannil et al.¹¹, who both found that GDM is a strong predictor of prenatal depression, this may account for the prevalence of depression in GDM.

Antenatal depression was shown to be 20% more common in pregnant women with GDM and 13% in those without GDM, according to a research by Byrn et al.¹² Additionally, they noted that women with GDM were more likely to have had depression in the past. A greater percentage of women with GDM had a history of depression, according to the current study as well. This finding's clinical significance stems from the necessity of more thorough surveillance and early screening for GDM in women with a history of depression. Previous studies have suggested that depression may be a risk factor for type 2 diabetes.¹³ It has

been proposed that alterations in neurotransmitter activity brought on by depression could impair glycaemic regulation by causing hyperglycemia. Changes in neurotransmitter activity, especially those affecting serotonin, norepinephrine, and dopamine, are linked to depression. Elevated cortisol and catecholamine levels can result from these neurochemical alterations that alter the control of the hypothalamic-pituitary-adrenal axis and enhance sympathetic nervous system activity. These neuroendocrine disorders may have a detrimental impact on glycaemic regulation, decrease glucose metabolism, and increase insulin resistance. This could be the physiological process by which depression makes a person more likely to develop diabetes.¹⁴ Furthermore, research has indicated a noteworthy correlation between depression and hyperglycemia in people with both type 1 and type 2 diabetes.¹⁵ Bowers et al. discovered that a past history of depression was strongly linked to the development of GDM (odds ratio: 1.42, 95% CI: 1.26-1.60) in a large study involving 121260 women.¹⁶

Numerous sociodemographic factors that were linked to prenatal depression were also investigated in our study. Pregnancy-related difficulties are significantly influenced by age; in our sample, women with substantial prenatal depression were older than those without depression ($p = 0.039$). One explanation could be that older pregnant women are more likely to experience depression because of the increased cumulative stress and health issues they confront.¹⁷ Prenatal depression was more common in women with lower socioeconomic level and lower perceived social support ($p < 0.05$). In lower socioeconomic groups, mental health problems may be exacerbated by financial stress and a lack of resources. Regardless of their actual family structure, those who feel unsupported are more likely to experience depression.¹⁸ This makes the idea of social support extremely important. Low perceived social support was also noted by Chalise et al. as a significant predictor of prenatal depression.¹⁹

One important aspect that emerged was education level. The likelihood of women screening positive for depression was considerably higher for those with less education (≤ 10 th grade). Reduced health literacy, fewer job possibilities, and impaired coping skills are all associated with lower levels of education, and these factors can make people more vulnerable to psychological distress during pregnancy.²⁰ Living in a rural area was also linked to an increased risk of depression, which may be because of the stigma associated with mental illness in these areas, the lack of access to prenatal mental health care, and the lack of social support networks.²⁰

This study also found a significant correlation between depressive symptoms and family history of depression. Compared to women without a family history, those with a family history of depression reported far higher levels of depression. Joint families might offer more logistical and social support, but they can also put women under familial and cultural pressure to follow gender norms or put up with interpersonal conflicts, which can increase psychological stress during pregnancy.²¹ This result is consistent with research from South Asian nations, where the dynamics of extended families have an impact on women's mental health.

Pregnancy status, whether intentional or not, also had a significant impact. In keeping with earlier studies that identify emotional unpreparedness, interrupted life plans, and concern about future caregiving responsibilities as key causes of prenatal mood disorders, unplanned pregnancies were significantly linked to antenatal depression.²² Additionally, women who experienced irregular sleep patterns were more likely to report depressive symptoms, which is consistent with mounting data that suggests sleep disruption is a risk factor for postpartum depression as well as a symptom of it.²³

Another crucial area that was assessed was obstetric history. Compared to primigravidas, multigravidas experienced significantly higher rates of depression. This might be the result of cumulative mental and physical strains from prior pregnancies, particularly in places with little resources where having children frequently accompanies financial difficulties and insufficient support networks.²⁴ Abortion history was also strongly linked to depression, most likely as a result of unresolved grief, a fear of recurrence, or a decreased perception of the current pregnancy's viability. This confirms previous findings by Mergl et al. that women who had experienced previous pregnancy losses had higher levels of depressed symptoms.²⁵

One of the most important conclusions was the unmistakable connection between sadness and a history of GDM, either present or former. The long-term psychological effects of metabolic diseases are shown by the fact that women who had a prior pregnancy with GDM were more than four times as likely to experience depression during the current pregnancy. This is in line with research by Hinkle et al., which showed that having GDM in the past may make a woman more likely to expect problems in future pregnancies, which raises antenatal stress.²⁶

Interestingly, our study found no significant correlation between antenatal depression and factors such as maternal age, religion, employment position, or the number of prenatal visits. This runs counter to some previous research that identified fewer prenatal visits or a younger mother as risk factors.²⁷ It's possible that other psychosocial factors had a greater impact or that these variables were more similar in both groups, which would explain the absence of relationship in our sample.

It is impossible to exaggerate the significance of prenatal depression screening. In addition to negatively impacting the mother's quality of life, depression during pregnancy

may have negative effects on the development of the fetus, such as low birth weight, premature birth, and poor neonatal adaptation.²⁵ Furthermore, untreated prenatal depression is a known risk factor for postpartum depression, which can harm the long-term development of the child and the attachment between the mother and infant.²⁷

Strength and limitations of the study

This study's strengths include a matched comparison group, a large sample size, and the use of a standardized screening technique, all of which strengthen the results. The thorough evaluation of behavioral, obstetric, and sociodemographic risk variables offers a multifaceted view of prenatal depression as well. Nonetheless, it is necessary to recognize certain restrictions. Causal inference is not possible due to the study's cross-sectional design. Furthermore, every response was self-reported, which could add bias related to social desirability or recall. Additionally, the single center concept restricts generalizability to larger populations, particularly in primary care or rural settings. Notwithstanding these drawbacks, the results offer important new information for policymakers and doctors alike. Obstetricians, endocrinologists, and mental health specialists should all be included in a multidisciplinary approach because of the link between GDM and prenatal depression. It is imperative that mental health screening be incorporated into prenatal procedures and that women with GDM undergo regular evaluations of their emotional health. This gap in prenatal care may be closed with the use of awareness campaigns, community-level interventions, and frontline health worker capacity building.

CONCLUSION

This study concludes by emphasizing how physical and mental health are interwoven throughout pregnancy. In addition to being a metabolic disorder, gestational diabetes can make pregnant mothers more emotionally vulnerable. These results highlight the necessity of routine mental health screening as part of integrated prenatal care, particularly for women with obstetric or metabolic risk factors. Pregnancy outcomes, long-term child health, and maternal well-being can all be enhanced by early detection and treatment of prenatal depression. One of the most important steps toward providing comprehensive maternity care may be integrating psychological assistance into GDM treatment procedures.

REFERENCES

- American Diabetes Association Professional Practice Committee. 2. Classification and diagnosis of diabetes: Standards of medical care in diabetes-2022. *Diabetes Care*. 2022;45(Suppl_1):S17-38. <https://doi.org/10.2337/dc22-s002>
- Sharma AK, Singh S, Singh H, Mahajan D, Kolli P, Mandadapu G, et al. Deep insight of the pathophysiology of gestational diabetes mellitus. *Cells*. 2022;11(17):2672. <https://doi.org/10.3390/cells11172672>
- Li G, Wei T, Ni W, Zhang A, Zhang J, Xing Y, et al. Incidence and risk factors of gestational diabetes mellitus: a prospective cohort study in Qingdao, China. *Front Endocrinol (Lausanne)*. 2020;11:636. <https://doi.org/10.3389/fendo.2020.00636>
- Moon JH, Jang HC. Gestational diabetes mellitus: Diagnostic approaches and maternal-offspring complications. *Diabetes Metab J*. 2022;46(1):3-14. <https://doi.org/10.4093/dmj.2021.0335>
- Khattak AA, Rana MY, Gajani SA, Mazhar R, Siddique AA, Farooq N. Frequency of depression in patients with gestational diabetes. *J Soc Obstet Gynaecol Pak*. 2023;13(1):41-4.
- Shuffrey LC, Lucchini M, Morales S, Sania A, Hockett C, Barrett E, et al.; Program collaborators for Environmental

- influences on Child Health Outcomes. Gestational diabetes mellitus, prenatal maternal depression, and risk for postpartum depression: an Environmental influences on Child Health Outcomes (ECHO) Study. *BMC Pregnancy Childbirth*. 2022;22(1):758.
<https://doi.org/10.1186/s12884-022-05049-4>
7. Tasnim S, Auny FM, Hassan Y, Yesmin R, Ara I, Mohiuddin MS, et al. Antenatal depression among women with gestational diabetes mellitus: a pilot study. *Reprod Health*. 2022;19(1):71.
<https://doi.org/10.1186/s12978-022-01374-1>
 8. Natasha K, Hussain A, Khan AK. Prevalence of depression among subjects with and without gestational diabetes mellitus in Bangladesh: A hospital based study. *J Diabetes Metab Disord* 2015;14:64.
<https://doi.org/10.1186/s40200-015-0189-3>
 9. Wilson CA, Newham J, Rankin J, Ismail K, Simonoff E, Reynolds RM, et al. Is there an increased risk of perinatal mental disorder in women with gestational diabetes? A systematic review and meta-analysis. *Diabet Med* 2020;37:602-22.
<https://doi.org/10.1111/dme.14170>
 10. Katon JG, Russo J, Gavin AR, Melville JL, Katon WJ. Diabetes and depression in pregnancy: Is there an association? *J Womens Health (Larchmt)* 2011;20:983-9.
<https://doi.org/10.1089/jwh.2010.2662>
 11. Kozhimannil KB, Pereira MA, Harlow BL. Association between diabetes and perinatal depression among low-income mothers. *JAMA* 2009;301:842-7.
<https://doi.org/10.1001/jama.2009.201>
 12. Byrn M, Penckofer S. The relationship between gestational diabetes and antenatal depression. *J Obstet Gynecol Neonatal Nurs*. 2015, 44:246-55.
<https://doi.org/10.1111/1552-6909.12554>
 13. Chireh B, Li M, D'Arcy C. Diabetes increases the risk of depression: a systematic review, meta-analysis and estimates of population attributable fractions based on prospective studies. *Prev Med Rep*. 2019, 14:100822.
<https://doi.org/10.1016/j.pmedr.2019.100822>
 14. Khawagi WY, Al-Kuraishy HM, Hussein NR. Depression and type 2 diabetes: a causal relationship and mechanistic pathway. *Diabetes Obes Metab*. 2024, 26:3031-44.
<https://doi.org/10.1111/dom.15630>
 15. Bădescu SV, Tătaru C, Kobylinska L, Georgescu EL, Zahiu DM, Zăgrean AM, Zăgrean L: The association between diabetes mellitus and depression. *J Med Life*. 2016, 9:120-5.
 16. Bowers K, Laughon SK, Kim S, Mumford SL, Brite J, Kiely M, Zhang C: The association between a medical history of depression and gestational diabetes in a large multi-ethnic cohort in the United States. *Paediatr Perinat Epidemiol*. 2013, 27:323-8.
<https://doi.org/10.1111/ppe.12057>
 17. Aasheim V, Waldenström U, Hjelmstedt A, Rasmussen S, Pettersson H, Schytt E: Associations between advanced maternal age and psychological distress in primiparous women, from early pregnancy to 18 months postpartum. *BJOG*. 2012, 119:1108-16.
<https://doi.org/10.1111/j.1471-0528.2012.03411.x>
 18. Knifton L, Inglis G: Poverty and mental health: policy, practice and research implications. *BJPsych Bull*. 2020, 44:193-6.
<https://doi.org/10.1192/bjb.2020.78>
 19. Chalise A, Shrestha G, Paudel S, Poudyal AK: Antenatal depression and its associated factors among women of Godawari Municipality, Lalitpur, Nepal: a cross-sectional study. *BMJ Open*. 2022, 12:e063513.
<https://doi.org/10.1136/bmjopen-2022-063513>
 20. Kirkbride JB, Anglin DM, Colman I, Dykxhoorn J, Jones PB, Patalay P, et al. The social determinants of mental health and disorder: Evidence, prevention and recommendations. *World Psychiatry* 2024;23:58-90.
<https://doi.org/10.1002/wps.21160>
 21. Al-Mutawtah M, Campbell E, Kubis HP, Erjavec M. Women's experiences of social support during pregnancy: A qualitative systematic review. *BMC Pregnancy Childbirth* 2023;23:782.
<https://doi.org/10.1186/s12884-023-06089-0>
 22. Muskens L, Boekhorst MG, Kop WJ, van den Heuvel MI, Pop VJ, Beerthuizen A. The association of unplanned pregnancy with perinatal depression: A longitudinal cohort study. *Arch Womens Ment Health* 2022;25:611-20.
<https://doi.org/10.1007/s00737-022-01225-9>
 23. Fu T, Wang C, Yan J, Zeng Q, Ma C. Relationship between antenatal sleep quality and depression in perinatal women: A comprehensive meta-analysis of observational studies. *J Affect Disord* 2023;327:38 45.
<https://doi.org/10.1016/j.jad.2023.01.125>
 24. Ajinkya S, Jadhav PR, Srivastava NN. Depression during pregnancy: Prevalence and obstetric risk factors among pregnant women attending a tertiary care hospital in Navi Mumbai. *Ind Psychiatry J* 2013;22:37-40.
<https://doi.org/10.4103/0972-6748.123615>
 25. Mergl R, Quaatz SM, Lemke V, Allgaier AK. Prevalence of depression and depressive symptoms in women with previous miscarriages or stillbirths – A systematic review. *J Psychiatr Res* 2024;169:84-96.
<https://doi.org/10.1016/j.jpsychires.2023.11.021>
 26. Hinkle SN, Buck Louis GM, Rawal S, Zhu Y, Albert PS, Zhang C. A longitudinal study of depression and gestational diabetes in pregnancy and the postpartum period. *Diabetologia* 2016;59:2594-602.
<https://doi.org/10.1007/s00125-016-4086-1>
 27. Prabhu S, Guruvare S, George LS, Nayak BS, Mayya S. Prevalence and associated risk factors of antenatal depression among pregnant women attending tertiary care hospitals in South India. *Depress Res Treat* 2022;2022:9127358.
<https://doi.org/10.1155/2022/9127358>