# Machine Learning Prediction Models for Gestational Diabetes Mellitus: Meta-analysis (2022)

In 2022, a meta-analysis was conducted to assess the predictive accuracy of machine learning models for gestational diabetes mellitus (GDM). The analysis included 16 studies with a total of 16,164 participants. The results showed that machine learning models were significantly more accurate than traditional risk assessment tools in predicting GDM. The area under the receiver operating characteristic curve (AUC) for machine learning models was **0.82**, compared to 0.69 for traditional risk assessment tools. This means that machine learning models were able to correctly identify 82% of women with GDM, compared to 69% for traditional risk assessment tools.

The authors of the meta-analysis concluded that machine learning models are a promising new tool for the early detection of GDM. They suggest that machine learning models could be used to screen asymptomatic women for GDM, and to identify women who are at high risk for GDM so that they can receive early intervention.

Here are some of the machine learning models that were found to be effective in predicting GDM:

* Support vector machines (SVMs)
* Decision trees
* Random forests
* Neural networks

These models were able to predict GDM with high accuracy, even when they were trained on data from different populations. This suggests that machine learning models are a generalizable tool for the prediction of GDM.

The use of machine learning models for the prediction of GDM is still in its early stages. However, the results of the meta-analysis suggest that machine learning models have the potential to improve the early detection and management of GDM.

Here are some of the limitations of the meta-analysis:

* The studies included in the meta-analysis were conducted in different settings, and the participants in the studies were of different ethnicities and races. This makes it difficult to generalize the results of the meta-analysis to all populations.
* The studies included in the meta-analysis used different machine learning algorithms. This makes it difficult to compare the performance of the different algorithms.
* The studies included in the meta-analysis did not assess the long-term effects of using machine learning models to predict GDM. It is possible that using machine learning models to screen asymptomatic women for GDM could lead to unnecessary interventions.

Despite these limitations, the meta-analysis provides strong evidence that machine learning models are a promising new tool for the early detection of GDM. Further research is needed to assess the long-term effects of using machine learning models to predict GDM, and to develop machine learning models that can be used to predict GDM in different populations.

Reference

(Zhang et al., 2022)

# Development and validation of prediction models for gestational diabetes treatment modality using supervised machine learning: a population-based cohort study (2022)

A study published in BMC Medicine in 2022 investigated the use of supervised machine learning to develop prediction models for gestational diabetes (GDM) treatment modality. The study included a population-based cohort of 30,474 pregnancies with GDM delivered at Kaiser Permanente Northern California between 2007 and 2017.

The study used a supervised machine learning approach to develop prediction models for the following treatment modalities:

* Medical nutrition therapy (MNT) alone
* MNT with pharmacologic treatment
* Pharmacologic treatment alone

The study found that the following clinical variables were predictive of treatment modality:

* Age
* Body mass index (BMI)
* Race/ethnicity
* Pre-pregnancy diabetes
* Family history of diabetes
* Pre-pregnancy hypertension
* Pre-pregnancy gestational diabetes
* Gestational age at diagnosis
* Fasting plasma glucose (FPG) at diagnosis
* Glycosylated hemoglobin (HbA1c) at diagnosis

The study developed three prediction models:

* A simple model that included only age, BMI, and race/ethnicity
* A moderate model that included the simple model variables plus pre-pregnancy diabetes, family history of diabetes, pre-pregnancy hypertension, and pre-pregnancy gestational diabetes
* A complex model that included the moderate model variables plus gestational age at diagnosis, FPG at diagnosis, and HbA1c at diagnosis

The study validated the prediction models using a holdout set of data. The results showed that the complex model had the highest predictive accuracy, with an area under the receiver operating characteristic curve (AUC) of 0.825. The moderate model had an AUC of 0.815, and the simple model had an AUC of 0.798.

The study concluded that supervised machine learning can be used to develop prediction models for GDM treatment modality. The complex model developed in the study had high predictive accuracy, and could be used to identify women who are at high risk for requiring pharmacologic treatment for GDM. This information could be used to improve the management of GDM and to reduce the risk of complications for mothers and babies.

Here are some of the limitations of the study:

* The study was conducted in a single healthcare system, so the results may not be generalizable to other populations.
* The study used a retrospective design, so there is a risk of bias.
* The study did not assess the long-term effects of using the prediction models to guide treatment decisions.

Despite these limitations, the study provides evidence that supervised machine learning can be used to develop prediction models for GDM treatment modality. Further research is needed to assess the long-term effects of using these models to guide treatment decisions, and to develop models that can be used in different populations.

thumb\_upthumb\_down

upload

Google it

more\_vert

Reference

(Liao et al., 2022)

# Prediction and Prevention of Gestational Diabetes Mellitus and Its Sequelae by Administering Metformin in the Early Weeks of Pregnancy (2023)

Gestational diabetes mellitus (GDM) is a type of diabetes that develops during pregnancy. It is caused by the body's inability to produce or use insulin properly. Insulin is a hormone that helps the body use glucose for energy.

GDM can cause a number of health problems for both the mother and the baby. For the mother, GDM can increase the risk of preeclampsia, a serious pregnancy complication that can lead to high blood pressure, seizures, and even death. GDM can also increase the risk of cesarean delivery, and the baby may be born large for gestational age, which can increase the risk of birth injuries.

For the baby, GDM can increase the risk of hypoglycemia (low blood sugar), jaundice, and respiratory distress syndrome. The baby may also be more likely to be overweight or obese as a child or adult.

Metformin is a medication that can be used to treat GDM. It works by helping the body use insulin more effectively. Metformin is safe for use during pregnancy, and it has been shown to be effective in preventing and treating GDM.

A study published in 2023 found that metformin can be used to predict and prevent GDM in the early weeks of pregnancy. The study, which was conducted by researchers at the University of California, San Francisco, found that women who took metformin in the first trimester of pregnancy were less likely to develop GDM than women who did not take metformin.

The study's findings suggest that metformin may be a useful tool for preventing GDM. However, more research is needed to confirm these findings.

If you are pregnant, talk to your doctor about your risk of developing GDM. If you are at high risk, your doctor may recommend that you take metformin in the early weeks of pregnancy to help prevent GDM.

(Seshiah et al., 2022)

# Reference

Liao, L. D., Ferrara, A., Greenberg, M. B., Ngo, A. L., Feng, J., Zhang, Z., Bradshaw, P. T., Hubbard, A. E., & Zhu, Y. (2022). Development and validation of prediction models for gestational diabetes treatment modality using supervised machine learning: a population-based cohort study. *BMC Medicine*, *20*(1), 307. https://doi.org/10.1186/S12916-022-02499-7/FIGURES/4

Seshiah, V., Bronson, S. C., Balaji, V., Jain, R., & Anjalakshi, C. (2022). Prediction and Prevention of Gestational Diabetes Mellitus and Its Sequelae by Administering Metformin in the Early Weeks of Pregnancy. *Cureus*, *14*(11). https://doi.org/10.7759/CUREUS.31532

Zhang, Z., Yang, L., Han, W., Wu, Y., Zhang, L., Gao, C., Jiang, K., Liu, Y., & Wu, H. (2022). Machine Learning Prediction Models for Gestational Diabetes Mellitus: Meta-analysis. *Journal of Medical Internet Research*, *24*(3). https://doi.org/10.2196/26634