Abstract

Purpose: predict gestational diabetes mellitus (GDM) in overweight and obese Caucasian women

Method: apply machine learning on PEARS dataset

Results: a support vector machine with polynomial kernel that is able to identify 44% and 67% of GDM women in early second trimester at 5% and 10% false positive rate respectively

Introduction

Gestational Diabetes Mellitus (GDM):
- Glucose intolerance of varying degrees of severity with onset or first recognition during pregnancy
- Affects 12.8% pregnant women in Ireland (2006-2009)
- Linked to gestational hypertension, polyhydramnios, Caesarean section, premature delivery, macrosomia, large for gestational age, neonatal intensive care unit admission…
- Increases in risk with overweight and obesity

Machine Learning:
- Powerful data-driven approach
- Expected to improve prognosis dramatically

Method

A randomized controlled trial of an arterial behavior change intervention to prevent GDM in overweight and obese women [1]

Results (cont.)

Performance of the models evaluated on the test set

<table>
<thead>
<tr>
<th>Setting</th>
<th>Evaluation Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut-off of 0.5</td>
<td>Sensitivity</td>
<td>0.78</td>
</tr>
<tr>
<td>Cut-off of 0.5</td>
<td>Specificity</td>
<td>0.89</td>
</tr>
<tr>
<td>Cut-off of 0.5</td>
<td>Positive predictive value</td>
<td>0.54</td>
</tr>
<tr>
<td>Cut-off of 0.5</td>
<td>Negative predictive value</td>
<td>0.96</td>
</tr>
<tr>
<td>Cut-off of 0.5</td>
<td>Balanced accuracy</td>
<td>0.84</td>
</tr>
<tr>
<td>5% false positive rate</td>
<td>Sensitivity</td>
<td>0.44</td>
</tr>
<tr>
<td>10% false positive rate</td>
<td>Sensitivity</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Discussion

This research explored the development of prediction models for GDM with a novel focus on the overweight and obese Caucasian group. The models achieved good performance, showing potential in assisting the early prediction of GDM in a clinical setting. Further research will be conducted on modelling remotely accessible maternal characteristics to reduce hospital visits during the COVID-19 pandemic.

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References