



Undergraduate

## Introduction

- Gestational diabetes mellitus (GDM) is any degree of glucose intolerance that was first recognized during pregnancy (American Diabetes Association, 2020).
- GDM influences up to 28% of pregnant women globally (Jiwani et al., 2012). Malaysia was the fifth leading country with 18.5% GDM prevalence rate (Lee et al., 2018).
- Women with a history of GDM had a **higher risk of type 2 diabetes (T2DM)** compared to women without a history of GDM (Lee et al., 2008).
- Comparing the characteristics of women with and without a history of GDM can identifying their risk of T2DM. However, studies comparing the characteristics of women with and without a history of GDM were limited in Malaysia.

## Objective

To compare sociodemographic factors and nutritional status between women with and without a history of GDM in Malaysia via an online platform.

## Methodology

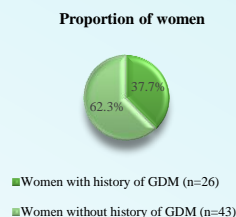
Study design	Comparative cross sectional study
Sampling method	Convenience sampling
Study location	Malaysia
Respondents	69 women
Study approval	Ethics Committee for Research Involving Human Subjects of UPM (JKEUPM)
Data analysis	SPSS Version 25 software <ul style="list-style-type: none"> <li>Frequency and percentage for categorical variables</li> <li>Mean and standard deviation for continuous variables</li> <li>Independent t-test &amp; Mann-Whitney U test : continuous variables between 2 groups</li> <li>Pearson's Chi-Squared test : categorical variables between 2 groups</li> </ul>

**Table 1**  
Measures and Instrument

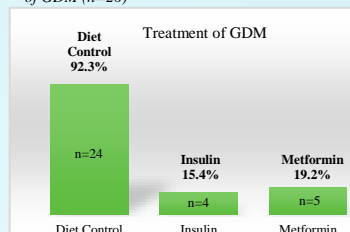
Variables	Instruments/ Measurements
Sociodemographic factors	Structured questionnaires in Google Forms
Obstetric history	Structured questionnaires in Google Forms
Type 2 Diabetes Risk	Finland Diabetes Risk Score (Lindström & Tuomilehto, 2003)
Anthropometric	Self reported measurements: <ul style="list-style-type: none"> <li>Body mass index (BMI)</li> <li>Waist circumference</li> </ul>
Food intake	Diet Screener from Singapore (Whitton et al., 2018) → Nutritionist Pro

## Results

**Figure 1**  
Proportion of women with and without a history of GDM



**Figure 2**  
Treatment of GDM among women with history of GDM (n=26)



**Table 2**  
Comparison of characteristics between women with and without history of GDM

Variables	History of GDM		t/χ <sup>2</sup>	p-value
	Yes	No		
<b>Monthly household income</b>	7630±7747	11646±5980	-2.356	<b>0.022**c</b>
RM 1000.01 – RM 5000.00	15(57.3)	7(16.3)		
>RM 5000.00	11(42.3)	36(83.7)		<b>0.001**a</b>
<b>Current age (years)</b>	33.2±6.4	41.7±7.8	-4.703	<b>0.001**a</b>
<b>Age during last pregnancy</b>	29.6±5.1	33.2±4.0	-3.104	<b>0.003**c</b>
<b>Type 2 diabetes risk</b>	11.40±4.82	6.72±3.66	4.773	<b>0.001**c</b>
<b>Age group</b>			11.528	<b>0.002**b</b>
Under 45 years	25(96.2)	26(44.4)		
45-54 years	1(3.8)	16(37.2)		
55-64 years	0(0.0)	1(2.3)		
<b>Frequency of fruits and vegetables intake</b>			5.215	<b>0.022**a</b>
Everyday	33(50.0)	24(76.7)		
Not everyday	13(50.0)	10(23.3)		
<b>History of hyperglycemia</b>			57.546	<b>0.001**a</b>
Yes	27(100.0)	0(0.0)		
No	3(7.0)	40(93.0)		
<b>FOOD INTAKE AND DIETARY HABIT</b>				
<b>Energy (kcal/day)</b>	1165±560	1230±503		0.353 <sup>c</sup>
<b>Carbohydrate (g/day)</b>	194.4±91.7	202.2±79.0		0.150 <sup>c</sup>
<b>Sugar (g/day)</b>	20.0±23.0	28.4±18.3		<b>0.001**c</b>
<b>Total fiber (g/day)</b>	4.2±2.7	5.6±3.5		<b>0.034<sup>bc</sup></b>
<b>Non starchy vegetables (g/day)</b>	15.6±16.2	32.8±30.9		<b>0.001**c</b>
<b>Legume and legume product (g/day)</b>	6.6±8.7	12.8±16.9		<b>0.029<sup>bc</sup></b>
<b>Fruits (g/day)</b>	111.3±263.9	179.9±145.1		<b>0.001**c</b>
<b>Length of time taking supplement</b>			9.370	<b>0.008**ab</b>
More than 5 years	0(0)	10(40.0)		
Between 1-5 years	6(37.5)	6(24.4)		
Less than 1 years	10(62.5)	9(36.0)		
<b>Ask for low sugar coffee (n=54)</b>			7.747	<b>0.020**b</b>
Always	7(38.9)	26(72.2)		
Sometimes	8(44.4)	4(11.1)		
Never	3(16.7)	6(16.7)		
<b>Ask for low sugar tea (n=56)</b>			10.983	<b>0.004**ab</b>
Always	6(27.3)	24(70.6)		
Sometimes	11(50.0)	5(14.7)		
Never	5(22.7)	5(14.7)		
<b>Ask for low sugar malted beverage (n=42)</b>			12.269	<b>0.002**ab</b>
Always	5(27.8)	16(66.7)		
Sometimes	9(50.0)	1(4.2)		
Never	4(22.2)	7(29.2)		

\*Significant at p<0.05, \*\*Significant at p<0.01

<sup>a</sup>: Pearson's Chi-Squared test, <sup>b</sup>: Fisher's Exact test, <sup>c</sup>: Independent t-test, <sup>d</sup>: Mann-Whitney U test

## Discussion

- Proportion of women with history of GDM was **higher than local study** (18.5%) and comparable to the prevalence rate in Asian countries ranging from 1.5% (Nepal) to 38.6% (Taiwan) (Lee et al., 2018).
- Women with a history of GDM were **significantly younger** compared to women without a history of GDM → difference in lifestyle practices. Younger women were found to have **more processed meat** (Hjartåker & Lund, 1998) where high processed meat was significantly associated with an increased GDM risk (Mozaffarian, 2016).
- Women with a history of GDM had a **significantly lower monthly household income**. This could be due to a **better pregnancy outcomes** when they have access to **advanced medical resources and healthy dietary concepts** (He et al., 2020).
- Women with a history of GDM had a **higher T2DM risk** compared to women without history of GDM. This was consistent with other studies (Lee et al., 2018). The risk factors that differ significantly were age, history of hyperglycemia and frequency of fruits and vegetables intake.
- A **lower sugar intake** was found among women with a history of GDM. This was contradicted with other studies (Fan et al., 2019). Most of the women participating in this study had **diet control** during GDM. So, they might receive Medical Nutrition Therapy counselling during GDM. Sugar intake was limited to 10% of the daily energy intake (Kamarudin et al., 2015) which resulted in a lower sugar intake.
- Besides, women with a history of GDM had a **lower fiber intake** as supported by **lower legumes, non starchy vegetables and fruits intake**. This might probably due to **no significant difference of nutrition knowledge score** (Ali et al., 2013).
- In terms of dietary habits, women with a history of GDM had a **lesser tendency to ask for low sugar beverages**. Therefore, **education related to sugar intake** should always be emphasized to women with a history of GDM as it might be a risk factor of developing other comorbidities.

## Conclusion

- Proportion of women with a history of GDM in this study was 37.7%.
- Women with a history of GDM were significantly younger, had a lower monthly household income, lower intake of sugar, total fiber, non starchy vegetable, legume and fruits, more tendency to add sugar-based milk into tea, less tendency to ask for low sugar beverages and had a higher T2DM risk.
- Nutritional education should focus on women with a history of GDM as they have a high risk of developing T2DM.
- Further studies can be conducted locally for a deeper investigation on the comparison of sociodemographic factors and nutritional status among women with and without a history of GDM.

## Acknowledgement

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