Universal Vs Population specific BMI as a predictor of maternal & fetal outcomes

Dr G Muniswaran

Malaysia
Obesity – the epidemic

Prevalence of obesity (%)
- <10
- 10–19.9
- 20–29.9
- ≥30
- Data not available
- Not applicable

* BMI ≥30kg/m²

World Obesity Federation 2015

WHO Overweight and Obesity January 2015
Figure 1: Prevalence rates of overweight and obesity in Asia Pacific countries compared to Australia, UK, New Zealand and USA, 2008

Obesity Burden

- 3.4 million deaths, 3.9% of years lost & DALY

- Health burden

Lancet 2014, Global Burden of Disease Study

BMJ OPEN 2014
Obesity & Pregnancy

BMI risk stratification tool in Obstetrics

ACOG, Committee Opinion 549, January 2013
CMACE/RCOG Joint Guideline 2010
NICE, weight management public Health Guidance 27, July 2010
RANCOG, College Statement C-Obs 49, March 2013
The Obstetrician

TIME

How the first nine months shape the rest of your life

The new science of fetal origins

BY ANNE MURPHY PAUL
Definition of BMI

- Gender
- Age
- Ethnicity

Centres for Disease Control and Prevention
Population specific BMI

ASIAN Specific references

Population specific references

Lancet 2004
BMJ 2014
IDF
IFSO- Asia Pacific 2011
OBJECTIVES

- Maternal
- Fetal

BMI
1) WHO
2) ASIAN
3) Malaysian

- Maternal
- Fetal

National Obstetrics Registry (NOR)
METHODS

- **Cross sectional** retrospective cohort study

- Dataset is from the **National Obstetric Registry of Malaysia** (14 major tertiary hospitals nationwide)

- **Three year study period** from 1st January 2010 till 31st December 2012
DEFINITIONS

Inclusion criteria

- Booking BMI < 16 weeks
- WHO references
- ASIAN references 2004
- Malaysian references
- GDM based on NICE guidelines 2014

Exclusion criteria

- Booking >16 weeks of pregnancy
- Missing/incomplete data
- Multiple pregnancies
- IVF pregnancies
### The Malaysian BMI range

<table>
<thead>
<tr>
<th>Category</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.0</td>
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<tr>
<td>Normal</td>
<td>18.0-21.5</td>
</tr>
<tr>
<td>Overweight</td>
<td>21.6-24.9</td>
</tr>
<tr>
<td>Obesity</td>
<td>25.0-27.9</td>
</tr>
<tr>
<td></td>
<td>28.0-31.4</td>
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<tr>
<td></td>
<td>31.5-35.5</td>
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<td>&gt; 35.5</td>
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</tbody>
</table>

Receiver operating characteristics (ROC) curve

National Obstetrics Registry (NOR)
METHODS

Total Sample size
399,274 pregnant mothers

Included in study
298,642 pregnant mothers

WHO

ASIAN

MALAYSIAN
Primary outcomes

- Pre-gestational hypertension
- Pre-gestational diabetes

Adjusted for maternal age, parity & ethnicity

Secondary outcomes

- Primary Post partum haemorrhage
- Shoulder dystocia
- Fetal macrosomia
- Caesarean section

Outcome Variables

National Obstetrics Registry (NOR)
- **Multivariate analysis** using logistic regressions

- **Crude and adjusted odds ratio** with respective 95% confidence interval

- **Paired sample t-test** to compare the mean difference between odds ratio
RESULTS

National Obstetrics Registry (NOR)
Pre-gestational diabetes (n = 2,722)

WHO ASIAN MALAYSIAN

BMI 21.6

Overweight Class 1 obesity Class 2 obesity Class 3 obesity
Pre-gestational Hypertension (n=3,051)

BMI

Overweight

Class 1 Obesity

Class 2 obesity

Class 3 obesity

WHO

ASIAN

MALAYSIAN
Caesarean section (n=95,085)

<table>
<thead>
<tr>
<th>Class</th>
<th>WHO</th>
<th>ASIAN</th>
<th>MALAYSIAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight</td>
<td>1.34</td>
<td>1.26</td>
<td>1.33</td>
</tr>
<tr>
<td>Class 1 obesity</td>
<td>1.84</td>
<td>1.68</td>
<td>1.93</td>
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<tr>
<td>Class 2 obesity</td>
<td>2.59</td>
<td>2.35</td>
<td>2.58</td>
</tr>
<tr>
<td>Class 3 obesity</td>
<td>3.57</td>
<td>3.4</td>
<td>3.68</td>
</tr>
</tbody>
</table>

WHO ASIAN MALAYSIAN
National Obstetrics Registry (NOR)

NOR
Primary PPH (n=2,091)

- Overweight
  - WHO: 1.19
  - ASIAN: 1.22
  - MALAYSIAN: 1.21

- Class 1 obesity
  - WHO: 1.53
  - ASIAN: 1.48
  - MALAYSIAN: 1.44

- Class 2 obesity
  - WHO: 1.52
  - ASIAN: 1.62
  - MALAYSIAN: 1.6

- Class 3 obesity
  - WHO: 1.84
  - ASIAN: 1.8
  - MALAYSIAN: 1.87

National Obstetrics Registry (NOR)
Shoulder dystocia (n=758)

- Overweight
- Class 1 Obesity
- Class 2 Obesity
- Class 3 Obesity

Classifications:
- WHO
- ASIAN
- MALAYSIAN

BMI:
- WHO: 31.5
- ASIAN: 2.54
- MALAYSIAN: 2.54

Registry
Fetal macrosomia (n=5,331)
Population specific range is a more sensitive measure

<table>
<thead>
<tr>
<th>Range for Malaysians</th>
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<tbody>
<tr>
<td>&lt;18.0</td>
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<tr>
<td>18.0-21.5</td>
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</table>
Strength and limitations

Strength
- Sample size

Limitations
- Single registry
- Retrospective
- Underpowered for anaesthetic complications and thromboembolism
Acknowledgements

Director General of Health
NOR site co-ordinators
Dr Japaraj Robert Peter

Declaration of interest - NONE


THANK YOU
Extra Slides

National Obstetrics Registry (NOR)
Incidence

Adjusted for maternal age, parity & ethnicity

- Shoulder Dystocia (n=758) 0.2%
- Fetal macrosomia (n=5331) 1.3%
- Instrumental delivery (n=15320) 3.8%
- Caesarean section (n=95085) 23.8%
- Primary Postpartum Haemorrhage (n=2019) 0.5%
- Pre-existing Hypertension (n=3051) 0.8%
- Gestational Diabetes Mellitus (n=32328) 8.1%
- Pre-existing Diabetes Mellitus (n=2722) 0.7%
ROC curve

Comparing ROC Curves

- Worthless
- Good
- Excellent

True positive rate vs. False positive rate
BMI as a risk stratification tool in Obstetrics

- **Strong**
  - Pre-gestational hypertension
  - Fetal macrosomia

- **Moderate**
  - Pre-gestational Diabetes
  - Shoulder dystocia
  - Caesarean section
  - Primary PPH

- **Weak**
  - Stillbirth
  - Assisted conception