Gestational diabetes mellitus among women born in South East Asia:
A review of the evidence

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ABSTRACT

Objective: the aim of this paper was to examine rates of gestational diabetes mellitus (GDM) among women born in South East Asia, now residing in a developed country

Data sources: established health databases including: SCOPUS, MEDLINE, CINAHL, EMBASE and Maternity and Infant Care were searched for journal papers, published 2001–2011.

Study selection: studies that examined GDM among women born in South East Asia (SEA) were sought. Keywords included gestational diabetes and a search term for Asian ethnicity (Asian, Asia, race, ethnic, and ethnicity). Further searches were based on citations and references found in located articles. Of 53 retrieved publications, five met inclusion criteria.

Data extraction: data were extracted and organised under the following headings: GDM rates among women born in SEA; screening for GDM; and characteristics of GDM risk for SEA born women. Study quality was assessed by using the CASP (Critical Appraisal Skills Programme) guidelines.

Data synthesis: this review produced three main findings: (1) compared to combined Asian groups, GDM rates were lower among SEA women; (2) compared to other Asian sub-groups, GDM rates among SEA women were in the intermediate range; and (3) SEA born women demonstrated consistently higher rates of GDM than women from the same ethnic background who were born in countries such as the US, UK or Australia.

Conclusions: from this review, it was clear that a ‘one size fits all’ approach to Asian ethnicity was not useful for estimating GDM rates among SEA women. There was also considerable difference among women of SEA ethnicity born in South East Asia, compared to women of the same ethnic background born in developed countries. Future research should explore the unique characteristics of GDM risk for these women. Such information is necessary for the development of strategies for the prevention and treatment of GDM among SEA women.

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Introduction

Gestational diabetes mellitus (GDM) refers to diabetes that is first diagnosed in pregnancy. It affects approximately 3–8% of women in developed countries (Ferrara et al., 2002; Joshy and Simmons, 2006; Templeton and Pieris-Caldwell, 2008; Martin et al., 2010) and there is now considerable evidence to suggest that rates are strongly related to demographic characteristics such as ethnicity (Dornhorst et al., 1992; Cheung et al., 2001; Ferrara et al., 2002), older maternal age (Cheung et al., 2001) and obesity (Cheung et al., 2001; Ben Haroush et al., 2006). Additionally, GDM rates have increased rapidly in the past two decades, particularly in developed countries such as Australia and the US (Cheung and Blyth, 2003; Joshy and Simmons, 2006; Metzger, 2006). Much of this increase relates to greater ethnic diversity and rising rates of obesity in the population (Ferrara et al., 2004). Although GDM is usually temporary and disappears after pregnancy, it is nonetheless associated with significant maternal and infant morbidity, including maternal hypertension, caesarean section, macrosomia (birth weight > 4.0 kg), neonatal special care admission, stillbirth (Langer et al., 2005) and childhood obesity (Lawlor, 2011). Women with GDM in a previous pregnancy, also incur a 7–12 times greater lifetime risk for developing type 2 diabetes (Bellamy et al., 2009). Because of these risks, GDM is a significant concern for health professionals, including midwives, nurses, and doctors.

Non-Caucasian ethnicity is clearly linked to higher rates of GDM (Dabelea et al., 2005; Joshy and Simmons, 2006; Ferrara, 2007; Martin et al., 2010) and this is especially the case for Asian ethnicity (Cheung et al., 2001; Dabelea et al., 2005; Martin et al., 2010). Rates are generally reported in the region of 8–15% for Asian groups compared to approximately 4–7% for Caucasian women (Ferrara et al., 2004; Hunsberger et al., 2010; Rosenberg...
et al., 2005). Additionally, poorer infant outcomes, such as pre-term birth and macrosomia (Rao et al., 2006a), recurrence of GDM in subsequent pregnancies (Kim et al., 2007), and later development of type 2 diabetes (Cho et al., 2006), are all seen with greater frequency among Asian women with GDM.

Although the link between Asian ethnicity and gestational diabetes is well established, it remains very difficult to extract data relating to GDM rates among specific Asian sub-groups such as women born in South East Asia. This is because most studies report on individuals of Asian origin in a single group, irrespective of region or country of birth (Ferrara et al., 2004). Thus, the term Asian may equally refer to individuals from different world regions, such as the South Asia (Indian subcontinent), Central Asia (including Afghanistan), North Asia (including China and Mongolia) and South East Asia (including Vietnam, Malaysia, and Philippines). These areas are very different in terms of ethnicity, culture and dietary background (Hunsberger et al., 2010), which makes the combination of results problematic. Other studies combine Asian and Pacific Islander women into a single category (Baraban et al., 2008; Hunsberger et al., 2010), although these populations are also very different in key characteristics such as genetic composition and rates of obesity. To further add to this conundrum, women born in Asian countries may be considered together with women, of the same ethnicity born in developed countries, despite major differences between these groups (Kieffer et al., 1999). Such variation contributes to confusion and a lack of information about GDM in specific Asian sub-groups, such as women born in South East Asia, which is the group of interest for this review.

For the purpose of this review, South East Asia is defined as ASEAN (Association of South East Asian Nations) member states, including: Brunei, Burma (Myanmar), Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, Vietnam (ASEAN, Association of South East Asian Nations, 1967). South East Asia is an impoverished area with a long history of migration to developed countries such as Australia and the US, and to a lesser extent, to the UK (Martin et al., 2006). In Australia, for example, migrants from SEA countries accounted for 12.9% of all migrants in 2000–2001 and this figure increased to 14% in 2010–2011 (Australian Government Department of Immigration and Citizenship, 2012). Similarly, high numbers also migrate to the US, and in the 2011 US census report, SEA countries, Vietnam and Philippines were among the nine most common countries of birth recorded for foreign born US residents (US Census Bureau, 2010; Walters and Trevalyan, 2011). In the UK, migrants from SEA countries are not quite so numerous; however, SEA countries, Vietnam, Malaysia, and Thailand are included among the 60 most common countries of birth recorded for British residents (Office for National Statistics, UK, 2011). This finding has real implications for pregnancy care as increasing rates of migration from South East Asia means that women from this area, present with greater frequency for pregnancy care in developed countries (Anna et al., 2008; Davey et al., 2008; Kornosky et al., 2008). At the same time, considerable anecdotal evidence indicates that SEA born women are at high risk of GDM. For both these reasons, it is important to establish independently the risks of GDM for this Asian sub group. At present, there is limited information about GDM, in this group, to guide health-care professionals new to their care. This review therefore examined rates of GDM among women born in South East Asia and now presenting for pregnancy care in developed countries, such as Australia, the US and UK.

Methods

A computerised database search was conducted of established health databases, including: SCOPUS, MEDLINE, CINAHL, EMBASE and Maternity and Infant Care. The review was conducted in January 2011 and search parameters included publications within the previous 10 years (2000–2010). Quantitative studies were targeted if they included gestational diabetes and a search term for Asian ethnicity (Asian, Asia, race, ethnic, ethnicity), in the abstract. The results of the searches were managed in an Endnote library (Endnote 2, version 14). This exercise produced 53 abstracts of interest (step 1). Hand searches, based on citations and references of already retrieved articles, yielded an additional 3 articles (n=56) (step 2). Initial screening involved the exclusion of duplicates (n=13) (step 3). Thereafter, abstracts were excluded on the following basis (step 4):

- editorials, letters, opinion pieces, reviews;
- not written in English;
- focussed on diabetes types 1 and 2;
- focussed on GDM predictors such as obesity; and
- ethnicity other than Asian.

A total of 11 abstracts remained after this process (see Fig. 1, Table 1) and these full papers were obtained, and screened for fit with the review’s intent (step 5). Quality assessment and data extraction were independently undertaken by two researchers. Differences in assessment were resolved by discussion until agreement was reached. Both researchers double-checked papers for accuracy and completeness.

At this stage, papers were excluded if they did not include South East Asian ethnicity or a minimum of one of the associated countries (Brunei, Burma (Myanmar), Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, Vietnam) as discrete categories. After this process, seven papers remained and these papers were examined closely. Two additional papers were excluded at this stage as it was unclear if subjects had been born in South East Asia or the US (Rao et al., 2006b; Pedula et al., 2009). A total of five papers were included in the review (Stone et al., 2002; Savitz et al., 2008; Chu et al., 2009; Cripe et al., 2010; Hederson et al., 2010).

Quality assessment of included studies

Quality assessment of included studies was undertaken using the Critical Appraisal Skills Programme (CASP) guidelines for appraising quantitative studies (CSP, 2003, 2004, 2005). CASP guidelines ask three primary questions of a paper: (1) Is it trustworthy? (2) How important are the results? (3) How relevant is the paper? (Milne and Oliver, 1996). To date, CASP appraisal tools have been used in a variety of health areas including nursing, medical and maternity services (Luker et al., in press; Milne and Oliver, 1996). In this review, CASP guidelines were used to assess studies for the following features: clear focus, appropriate method, appropriate recruitment strategies, possible bias, confounding factors, believable results, and fit with available evidence (see Box 1). CASP questions 7 and 11 were excluded as Q.7 relates to follow up, a feature that is not compatible with the cross sectional method used by reviewed studies, and Q11 refers to the applicability of results for the local population. This feature was considered redundant as inter-country differences in GDM screening, health-care systems and population composition were judged likely to impact on the level of correspondence of findings with the local population. Ethnicity was assessed with Q.4 and GDM screening was assessed with Q.5. Each characteristic was scored 1 for present and 0 for absent with the exception of Q.6, which was allocated a score of 1 for each question, a total of 2. A final question (Q.13) was included to estimate external validity, based on the work of Downs and Black (1998). The total range of possible scores was 0–12, with 12 indicating the highest possible quality.
Findings

Characteristics of included studies

Of the five studies included in the review, each examined GDM against various measures including: ethnicity, maternal age, educational level, parity and body mass index (BMI). All five were population based quantitative studies. Four studies were conducted in the US and the final study was conducted in Australia. Sample size ranged from 19,030 (Cripe et al., 2010) to 3,108,877 women (Chu et al., 2009). Study focus varied, although all contained a central theme of interest in SEA ethnicity (born in South East Asia) and GDM incidence. Chu et al. (2009), Savitz et al. (2008) and Hedderson et al. (2010) compared GDM incidence between different Asian ethnic groups born both within and outside the US whereas Savitz et al. (2008) and Cripe et al. (2010) also compared GDM rates between women born in South East Asia and US born Caucasian women. Stone et al. (2002) compared GDM incidence among women born in different world regions including South East Asia, Europe, UK and the Americas. All studies extracted data from large population databases (see Table 2).

Methodological quality of included papers

On appraisal, all studies were clearly focussed with unambiguously stated aims and objectives. All used retrospective cross sectional methods and this approach is useful when the aim is to examine a cohort for specific characteristics, such as GDM (LoBiondo-Wood and Haber, 2002). Thus, large population based studies are an efficient means of looking at population trends and are suitable to answer the research questions explored by the studies reviewed here. Four studies extracted data from State databases (Stone et al., 2002; Savitz et al., 2008; Chu et al., 2009; Cripe et al., 2010) whereas the final study used data collected and maintained by the Kaiser Permanente foundation, which is America’s largest managed care organisation (Hedderson et al., 2010). In each

Table 1
Inclusion and exclusion criteria.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study</td>
<td>Research studies using quantitative methods</td>
<td>Qualitative studies, reviews, letters, editorials</td>
</tr>
<tr>
<td>Participants</td>
<td>Diagnosis of GDM South East Asian ethnicity as a discrete category</td>
<td>Types 1 and 2 Diabetes, Diabetes in pregnancy as a single category, screening/ management of GDM, GDM predictors in general, Ethnicity other than Asian</td>
</tr>
<tr>
<td>Study focus</td>
<td>Studies designed to evaluate rates of GDM among women born in South East Asia and presenting for pregnancy care in a developed country</td>
<td>GDM and biochemistry, physiology</td>
</tr>
</tbody>
</table>

Fig. 1. Selection of papers for review.

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case, data extraction was controlled by clearly defined inclusion/exclusion criteria, such as singleton birth within selected years. Additional measures were employed by some studies to ensure sample reliability (Stone et al., 2002; Savitz et al., 2008; Cripe et al., 2010; Hedderson et al., 2010). Each of these authors, Cripe et al. (2010), Hedderson et al. (2010) and Savitz et al. (2008) drew on birth certificate data but also cross matched results with hospital data to improve identification of GDM. Similarly, Stone et al. (2002) who extracted State held perinatal data, also cross-matched results with hospital data. In all papers, information about ethnicity was collected using a combination of self-reported maternal race, ethnicity and country of birth. Women identifying themselves as of more than one ethnic group were excluded from the analyses which means that women with mixed parentage were unlikely to have been included.

GDM rates were measured in each study, although only two studies made explicit the process of screening for GDM (Hedderson et al., 2010; Savitz et al., 2008). The results of included studies are likely to be reliable as the large State databases, from which data were extracted, undergo rigorous auditing processes to ensure dataset accuracy (Stone et al., 2002; Savitz et al., 2008; Cripe et al., 2010). The Kaiser Permanente clinical database (Hedderson et al., 2010) also employed measures to ensure data accuracy, such as including only those records that were complete. Three studies reported results that were adjusted after taking into consideration the effect of confounding factors such as: maternal age, parity, antenatal care, BMI/maternal weight and maternal education levels (Chu et al., 2009; Savitz et al., 2008; Hedderson et al., 2010). The remaining two studies discussed GDM incidence generally (Stone et al., 2002) or as one of a number of variables (Cripe et al., 2010). Hedderson et al. (2010) addressed this issue under limitations of the study. Overall, review results were largely consistent with extant literature which rendered them believable. Other than some variation in degree of association, all studies agreed that women born in South East Asia had significantly increased GDM rates, compared to US born women of the same ethnic background. Asians, involving women from disparate regions, ethnicities and dietary traditions. Articles that report on South East Asian ethnicity as a discrete variable often do so without taking country of birth into consideration. In effect, this means that women born in SEA countries are potentially considered together with women born in countries, such as the US, despite large differences in GDM rates between these groups. These features make it difficult to extract information specific to SEA born women. Nonetheless, despite these difficulties, this review offers some original insights into GDM rates among SEA women.

### Discussion

Overall, this review has highlighted a paucity of literature examining GDM rates among women born in South East Asia, who are now giving birth in countries such as the US, UK and Australia. This is of concern as increased migration from this part of the world means that midwives and other health professionals must increasingly provide pregnancy care for these women. What literature does exist is largely focussed on combined groups of Asians, involving women from disparate regions, ethnicities and dietary traditions. Articles that report on South East Asian ethnicity as a discrete variable often do so without taking country of birth into consideration. In effect, this means that women born in SEA countries are potentially considered together with women born in countries, such as the US, despite large differences in GDM rates between these groups. These features make it difficult to extract information specific to SEA born women. Nonetheless, despite these difficulties, this review offers some original insights into GDM rates among SEA women.

### Strengths and limitations

The strengths of this review process are the systematic search strategy used and the multiple databases searched. Limitations of

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**Box 1**

<table>
<thead>
<tr>
<th>CASP guidelines</th>
<th>Score 0/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Did the study address a clearly focused issue?</td>
<td>0/1</td>
</tr>
<tr>
<td>Q2. Did the authors use an appropriate method to answer their question?</td>
<td>0/1</td>
</tr>
<tr>
<td>Q3. Was the cohort recruited in an acceptable way?</td>
<td>0/1</td>
</tr>
<tr>
<td>Q4. Was the exposure accurately measured to minimise bias? (ethnicity)</td>
<td>0/1</td>
</tr>
<tr>
<td>Q5. Was the outcome accurately measured to minimise bias? (GDM screening)</td>
<td>0/1</td>
</tr>
<tr>
<td>Q6. a. Have the authors identified all important confounding factors?</td>
<td>0/1</td>
</tr>
<tr>
<td>b. Have they taken account of the confounding factors in the design and/or analysis?</td>
<td>0/1</td>
</tr>
<tr>
<td>Q7. (a) Was the follow up of subjects complete enough?</td>
<td>N/A</td>
</tr>
<tr>
<td>(b) Was the follow up of subjects long enough?</td>
<td></td>
</tr>
<tr>
<td>Q8. What are the results of this study? (Are they communicated clearly?)</td>
<td>0/1</td>
</tr>
<tr>
<td>Q9. How precise are the results?</td>
<td>0/1</td>
</tr>
<tr>
<td>Q10. Do you believe the results? (How believable are the results?)</td>
<td>0/1</td>
</tr>
<tr>
<td>Q11. Can the results be applied to the local population?</td>
<td>N/A</td>
</tr>
<tr>
<td>Q12. Do the results of this study fit with other available evidence?</td>
<td>0/1</td>
</tr>
<tr>
<td>Q13. Was the study representative of the entire population from which subjects were recruited?</td>
<td>0/1</td>
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</table>

**Findings**

There was a universal finding of increased rates of GDM among women born in South East Asia. Actual rates varied within the reviewed studies, from 6.1% to 9.6% (Stone et al., 2002; Savitz et al., 2008; Chu et al., 2009; Cripe et al., 2010; Hedderson et al., 2010) and although rates varied, there was internal consistency within the studies. GDM rates were in each case higher among SEA groups than comparison groups, such as Caucasian women. Overall, the review produced three main findings. Firstly, compared with combined Asian groups, GDM rates were lower among SEA women. Secondly, compared to other Asian sub-groups, GDM rates for SEA women were in the intermediate range, that is, lower than Central and South Asia groups, but higher than some East Asia groups (including Japan and Korea) (Stone et al., 2002; Savitz et al., 2008; Chu et al., 2009; Hedderson et al., 2010). Thirdly, women born in South East Asia had consistently higher rates of GDM compared to US born women of the same ethnic background. Finally, confounding factors, such as maternal age, maternal weight and parity were seen to exert little influence on GDM rates in this review (Chu et al., 2009; Hedderson et al., 2010; Savitz et al., 2008).
Table 2
Characteristics of included papers.

<table>
<thead>
<tr>
<th>Author, country</th>
<th>Aim</th>
<th>Design/Dataset</th>
<th>Inclusion criteria/confounders GDM screening</th>
<th>Ethnicity</th>
<th>Study objectives</th>
<th>Study outcomes</th>
<th>GDM rates</th>
<th>Findings/Conclusions</th>
<th>Study quality score (0–12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chu et al. (2004), USA</td>
<td>To estimate the prevalence of GDM for sub-groups of US Asian and Pacific Islander (API) women.</td>
<td>Retrospective cohort study using Birth certificate data from the National Center for Health Statistics 2005–2006</td>
<td>Exclusion criteria - Multiple birth, Pre-gestational diabetes, Incomplete records</td>
<td>Mother's race was self-recorded (including country of birth). Births with missing maternal race or ethnicity information were excluded.</td>
<td>To estimate the prevalence of gestational diabetes mellitus (GDM) for sub-groups of US Asian and Pacific Islander (API) women.</td>
<td>GDM rates by mother's place of birth API total 6.3% Filipino 6.9% Vietnamese 6.1%</td>
<td>Among Asian/Pacific Islander (API) sub-groups, age-adjusted GDM prevalence varied from 3.7% to 8.6%.</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Cripe et al. (2010), USA</td>
<td>To examine differences in perinatal outcomes of South East Asian (SEA) women compared with non-Hispanic white women in Washington.</td>
<td>Retrospective cohort study using Birth certificate and hospital discharge data from the University of Washington Birth Events Records Database (UW_BERD) 1993–2006</td>
<td>Exclusion criteria - Multiple birth, Pre-gestational diabetes, Incomplete records</td>
<td>Results adjusted for maternal age, education, marital status and parity</td>
<td>To examine perinatal outcomes among South East Asian (SEA) women compared to non-Hispanic white women in Washington, DC. USA.</td>
<td>Pre-existing maternal morbidity and pregnancy complications, including GDM Cambodian 6.5% Laotian 6.7% Vietnamese 8.2%</td>
<td>South East Asians (SEAs) had increased risks for gestational diabetes mellitus when compared with white women.</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Hedderson et al. (2010), USA</td>
<td>To examine the association between maternal country of birth and GDM incidence.</td>
<td>Retrospective cohort study using Birth data from the Kaiser Permanente of Northern California (KPNC) Gestational diabetes registry. 1995-2004</td>
<td>Exclusion criteria Multiple birth, Pre-gestational diabetes, Incomplete records</td>
<td>Maternal race, ethnicity and country of birth were self-reported. Maternal birthplace was categorized as inside or outside the US states. Women with unknown race-ethnicity were excluded.</td>
<td>To examine within racial-ethnicity groups whether the risk of GDM differed between women born inside and outside the US.</td>
<td>Age-adjusted prevalence of GDM, by race-ethnicity group and country of birth. SEA total 8.4% Filipino 9.6%</td>
<td>The age-adjusted prevalence of GDM varied by race-ethnicity and was lowest for non-Hispanic white (4.1%). Being born outside of the US was associated with an increased risk of GDM.</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Savitz et al. (2008), USA</td>
<td>To examine patterns of GDM prevalence among a wide range of ethnic groups</td>
<td>Birth cert data linked to Hospital discharge data 1995–2003 from the New York City Department of Health and Mental Hygiene</td>
<td>Exclusion criteria included - Multiple birth, Identification of GDM on only one data source, Pre-gestational diabetes, Incomplete records</td>
<td>US Census indication of race. Ethnic ancestry was listed as country of birth. Ethnic categories were created for every country with 1000 or more births during the period 1995–2003.</td>
<td>To examine patterns of occurrence of GDM among ethnic groups resident in New York City, USA.</td>
<td>Diagnosis of gestational diabetes on birth certificate or in hospital discharge. data Malaysian 9.3% Filipino 9.0% Vietnamese 8.4%</td>
<td>Foreign-born women had GDM higher GDM risk than US-born women. Highest rates were seen among Asian women.</td>
<td>11</td>
<td></td>
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</tbody>
</table>
the process include the exclusion of non-English language publications and literature which reported on combined Asian groups. Some of these publications may have contributed additional insights in the review. In terms of content, the large size of this review is advantageous, as studies involving almost four and a half million women are included. The accuracy and quality of the included studies (Stone et al., 2002; Savitz et al., 2008; Chu et al., 2009; Cripe et al., 2010) and clinical datasets (Hedderson et al., 2010) is also a strength. Moreover, papers included in this review were comparatively consistent in terms of method, quality and focus, and these features increase the value of combining results. However, direct comparison between studies was hampered by differing sample sizes. The use of birth certificate data, as in four studies (Savitz et al., 2008; Chu et al., 2009; Cripe et al., 2010; Hedderson et al., 2010) is also problematic, as GDM is likely to be under-reported on birth certificates. Each of the studies employed efforts to overcome this limitation and improve identification of GDM, including cross matching results to other sources, such as hospital data (Stone et al., 2002; Savitz et al., 2008; Cripe et al., 2010; Hedderson et al., 2010). Additionally, screening procedures for GDM were listed by just two studies (Savitz et al., 2008; Hedderson et al., 2010) as consistent with American Diabetes Association (ADA) recommendations, using the 50-g 1 hour glucose challenge test (GCT) followed by the 100-g 3 hour oral glucose tolerance test (OGTT). It is not clear what screening processes were used in the three remaining studies, or if universal or selective screening techniques were used. Variations of either could impact on rates of GDM.

Findings indicate that GDM rates for SEA women were in all cases between 6.1% and 9.6% in the reviewed studies, which although high compared to national averages, were less than the 8–15% commonly reported in combined Asian groups. Hunsberger et al. (2010), for example, found GDM rates of 14.8% among a combined group of Asian women, in the US, whereas Ferrara et al. (2004), who examined increasing incidence of GDM over a 10 year period in California, US also reported GDM rates of 7.8–12.1% among Asian women. The reasons behind this disparity may be explained in part by considerably higher GDM rates in specific Asian sub-groups such as South Asian (Asian Indian) or Central Asian. In the review, Stone et al. (2002), and Hedderson et al. (2010) found high GDM rates of 11.1–2.5% among South Asian women (Asian Indian). Stone additionally found rates of 13.7% among North East Asian women (including China and Mongolia) whereas Savitz et al. (2008) found rates of 14.3% among women of South and Central Asia (including India, Pakistan, Iran, Bangladesh, Afghanistan). Similar findings present in the literature evaluating GDM rates separately for these regions (Beischer et al., 1991; Yue et al., 1996). The lowest comparative incidence of GDM, among any Asian sub-group, was found among Japanese and Korean women and presents as something of an anomaly with rates in the range of 3.5–6.5% (Savitz et al., 2008; Chu et al., 2009; Hedderson et al., 2010). Although GDM in Japanese and Korean women is not extensively addressed in the literature, Rao et al. (2006b) found similar GDM rates of just 3.4% among Japanese women.

Finally, women born in South East Asia had higher rates of GDM compared to US born women of the same ethnic background. Chu et al. (2009), Hedderson et al. (2010) and Savitz et al. (2008) each reported differences between women of South East Asian ethnicity born inside or outside the US that reached significance. Taking the case of Filipino women, as an example, Savitz et al. (2008) found GDM rates of 9.4% for South East Asian born Filipino women compared to 4.1% for US born Filipino women, whereas Chu et al. (2009) found equivalent rates of 7.3% and 5.9%. Comparative literature is sparse; however, Kieffer et al. (1999) found similarly higher rates of GDM among women of Vietnamese and Filipino origin, who were born outside the US.
compared to women of the same ethnicities born within the US. Possible explanations for these high rates of GDM among women born outside the US, may relate to social disadvantage and diet, both of which are frequently discussed as mediating factors in GDM incidence (Wahlqvist, 2002; Ying and Wang, 2006; Anna et al., 2008). Many migrants live in poverty and are generally less likely than the local population to receive timely health care (Leclere et al., 1994). These circumstances may contribute to increased GDM rates (Anna et al., 2008; Link and McKinley, 2009). Research by Gluckman and Hanson (2008) and Chan et al. (2009) might offer some additional insight into this phenomenon. These authors suggest that poor nutrition of the mother while in utero herself, may have resulted in impaired fetal programming and impaired insulin production, which in turn results in a later predisposition to glucose intolerance in pregnancy. Gluckman and Hanson (2008) further postulate that impaired fetal programming can lead to a greater tendency towards visceral obesity, which is particularly associated with GDM. Over-nutrition post migration may compound the problem (Chan et al., 2009), and Hedderson et al. (2010) suggests that migration to developed countries may be associated with adopting a more sedentary lifestyle and with eating a ‘calorie dense low-fibre diet’ (p.446).

Implications for practice

At this stage, the literature relating to GDM incidence among women born in South East Asia is limited and there are many questions that warrant future examination. Such research should examine the specific characteristics of GDM risk for SEA born women as these women may have risk factors outside the currently known clinical risks for GDM. Secondly, it is important to examine Asian sub-groups separately. These groups have traditionally been studied in aggregate despite many differences in factors that may influence GDM rates. Moreover, little is known about diet, levels of activity during pregnancy and pregnancy mores among women born in South East Asia. Such research is a necessary first step in the design of interventions to prevent or treat high GDM rates in this group.

Finally, South East Asian migrants are a sizeable and growing group in developed countries such as Australia, the US and to a lesser extent, the UK. Childbearing women from this group face a number of pregnancy risks, and, in comparison to locally born women, SEA women are at higher risk of both developing and misunderstanding GDM (Anna et al., 2008; Carolan et al., 2010). Higher risk is related to ethnicity, lower socio-economic status and lower levels of education and migrants from SEA have some of the lowest rates of formal education of all migrants (Niedzwiecki and Duong, 2004). Some estimates indicate that as many as 6–45% of SEA migrants have received no formal schooling (Niedzwiecki and Duong, 2004). Migrants on humanitarian visas tend to have the lowest reported levels of education (ABS, 2011). These features foreshadow an increasing demand on resources and on health professionals providing pregnancy care.

Conclusions

In conclusion, this review has shown that GDM rates among women born in South East Asia are dissimilar to rates reported in combined Asian groups, and also differ from rates among other Asian sub-groups and among women of similar ethnicity, born in the US. It is thus important that nativity is taken into consideration when developing interventions to prevent and/or treat GDM among SEA women. Future research is warranted and should explore the unique characteristics of GDM risk for this group.

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References

ASEAN (Association of South East Asian Nations), Declaration, 1967.


