Should Race-Specific Medians Be Used in Second Trimester Maternal Serum Screening (MSS) for Down Syndrome?

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INTRODUCTION

The use of race-specific medians in second trimester biochemical screening for Down's syndrome (T21) is controversial. Spencer et al, 2000 found that there were significant differences between the Asian and Caucasians with free β-hCG 4% higher and PAPP-A 17% higher in Asian women compared to Caucasians [3] whereas Huang et al, 2003 did not find any significant differences among Afro-Caribbean and Caucasian women. We undertook a retrospective analysis to determine if its use would have influenced the effectiveness of antenatal serum screening for Down Syndrome in KKH.

OBJECTIVE

To test the effect of using race specific regression medians on the detection rate and screen positive rates in the screening program.

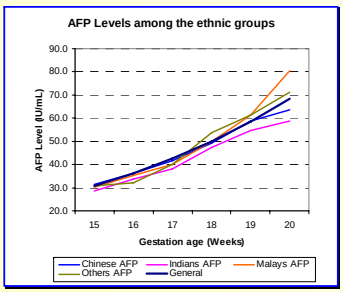
MATERIALS AND METHODS

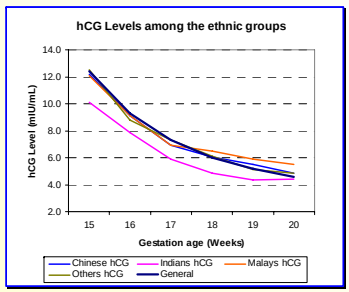
All mothers booking between 14 to 22 weeks gestation were offered MSS. Serum was taken and analyzed for both analytes: alpha-fetoprotein (AFP) and free-beta human chorionic gonadotrophin (β-hCG) which was then adjusted for maternal weight and converted to multiples of the unaffected median of the general population (MoMg) so as to enable comparisons that would be gestation-independent. The gestational age was based on ultrasound measurements of crown rump length (CRL) or head circumference if CRL was not available. Risk assessment **(Rg)** for T21 was computed based on the algorithm by Wald 1998 using the MoMg.

The regression curve of the medians were then obtained for the Chinese, Indian, Malay and Other races population and the AFP and free β-hCG were converted to their respective race-specific MoMs- **MoMc, MoMi, MoMm, MoMo** for the 4 groups mentioned. Risk assessment were calculated for these individual MoMs into **Rc, Ri, Rm, Ro** respectively. The 4 race-specific MoMs were then combined to form a race-specific MoM distribution **(MoMr)** and their Risks into a race-specific Risk for Downs **(Rr).**

The **MoMg** distribution and **MoMr** were normalized using logarithmic function and the 2 distributions were compared using the paired T test. The Risk ratio were then compared for Detection Rates, **DRg, DRr,** Screen Positive Rates, **SPRg, SPRr** and False Negative Rates, **FNRg, FNRr**.

Graph 1 showing Levels of the analytes for different ethnic groups



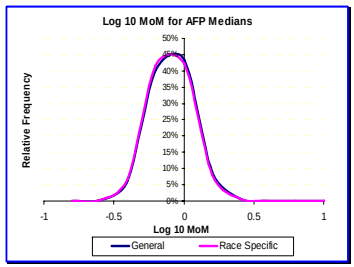


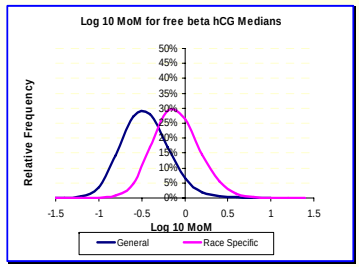
FINDINGS

This study of 16,653 singleton pregnancies with complete follow up outcome comprised 72.9% Chinese, 11.6% Malays, 10.0% Indians and 5.5% Other Races. AFP and β-hCG values were found to be significantly different among the races **(p<0.001)** at each gestation week. There were significant differences when comparing the general population and the race-specific MOM distributions **(p<0.001)** for both AFP & free β-hCG MoMs.

Although the detection rate was the same and there was only a slight improvement in the Positive Predictive Value (PPV) from 1: 78 to 1:70, there was a relative reduction of 10 % of the **SPRg 6.1%** to **SPRr 5.5%** translating into 100 amniocentesis that could have been avoided with approximately **S$65,000** saved for these patients and reduction in the anxiety and distress of going through amniocentesis.

Graph 2 showing Log 10 General (MoMg) and Race specifc medians(MoMr) of the analytes





CONCLUSIONS

The distribution parameters for APF MoMs & free-bhCG MoMs were statistically significant different for the four ethnic groups. With race specific medians, this has improved the efficiency of Maternal Serum Screening Testing by lowering the Screen Positive Rate without decreasing the detection rate of Down Syndrome. This findings were consistent with Spencer et al's conclusions that the use of race specific medians will not have a significant impact on overall detection rates though it could alter individual's risk.[3] Therefore, we would advocate the use of race-specific medians in second trimester serum screening for Down Syndrome in our local population.

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