Global risk assessment of cardiovascular disease in resource constrained settings

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Global risk assessment of cardiovascular disease in resource constrained settings

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BACKGROUND

- Cardiovascular disease (CVD) is an emerging problem in Sub-Saharan Africa.
- Many current guidelines recommend using global risk assessment (GRA) to quantify the risk for developing CVD and to guide treatment and policy.
- Most GRA tools require lipid measures which are not readily available in resource-constrained settings. Of the 3 most published non-laboratory based tools: Gaziano and Framingham substitute BMI for cholesterol; WHO does not include BMI or cholesterol.

RESEARCH QUESTIONS/HYPOTHESIS

- Is it feasible to implement GRA at the point-of-care in a resource-constrained country?
- In this convenience sample, are the Gaziano, Framingham and WHO global risk score (GRS) estimates similar?

METHODS

- A convenience sample of consecutive patients were screened/ treated for CV risk factors had risk factors measured.
- US/Kenyan teams used validated protocols for physiologic/ behavioral measures at 5 Kenyan community health clinics.
- Gaziano and Framingham covariates (age, gender, smoking, diabetes, SBP, BMI, antihypertensive Rx); WHO covariates (age, gender, smoking, diabetes, SBP).
- Gaziano GRS was calculated with paper tool at the point-of-care and recalculated by the researchers; Framingham and WHO GRS was calculated from the dataset.
- Clinical data was abstracted and analyzed using Stata.
- US/Kenyan IRB approval was obtained.

RESULTS

Pairwise Correlation of the 3 Global Risk Scores (GRS)

<table>
<thead>
<tr>
<th></th>
<th>FRscore</th>
<th>GAZ</th>
<th>WHO</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRscore</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAZ</td>
<td>0.8652</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>WHO</td>
<td>0.3506</td>
<td>0.3332</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Gaziano GRS was highly correlated with Non-lab Framingham GRS, WHO = WHO non-lab GRS

Distribution of Risk Factors by Clinical Cut Points

<table>
<thead>
<tr>
<th></th>
<th>All (N=941)</th>
<th>Stratified by Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Mean Blood Pressure [SBP 137.61, SD 23.61(N=941)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBP ≥ 140 mmHg</td>
<td>383</td>
<td>40.07</td>
</tr>
<tr>
<td>Mean Blood Glucose [97.53, SD 38.7, (n=935)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBS &gt; 126 or Non</td>
<td>39</td>
<td>4.22</td>
</tr>
<tr>
<td>FBS ≥ 200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI [24.89, SD 4.92, (n=893)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI ≥ 25</td>
<td>398</td>
<td>44.57</td>
</tr>
<tr>
<td>BMI ≥ 30</td>
<td>139</td>
<td>15.57</td>
</tr>
</tbody>
</table>

SBP = Systolic blood pressure; prehypertension 120-139/90 mmHg; Stage 1 = 140-159/90 mmHg; Stage 2 = ≥ 160/90 mmHg.
FBS = Random blood sugar; glucose intol ≥ 110 mg/dL; Diabetes ≥ 126 mg/dL fasting; ≥ 140 mg/dL non-fasting
BMI = Body mass index; malnourished <10; normal 18-25; overweight 25-29; obese ≥ 30

CONCLUSIONS

- GRA scores can be generated at the point-of-care using simple screening information and paper tools with 79.24% accuracy.
- The population screened had a high clustering of CV risk factors and high risk GRA scores; that information can be available in real time to guide clinicians in delivering evidence-based treatment.
- Gaziano GRS was highly correlated with Non-lab Framingham (0.87) but WHO GRS had low correlation with Framingham and Gaziano (0.36; 0.33). [Limitations; the survival data used to calculate Framingham GRS is based on US population; WHO is based on a hypothetical dataset.]
- At the population level GRA might be helpful to assess country-specific CVD risk, to plan risk reduction strategies and to guide health services policy in this resource-constrained country but the best tool is unclear.
- Population based cohort studies are needed to validate these tools in low income countries.

<table>
<thead>
<tr>
<th>Number of Risk Factors</th>
<th>Gaziano GRS</th>
<th>Non-lab Framingham</th>
<th>Non-lab WHO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Risk</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Low</td>
<td>486</td>
<td>56.32</td>
<td>556</td>
</tr>
<tr>
<td>Moderate</td>
<td>150</td>
<td>17.38</td>
<td>258</td>
</tr>
<tr>
<td>High</td>
<td>227</td>
<td>26.30</td>
<td>181</td>
</tr>
</tbody>
</table>

Key: Global Risk Scores for Framingham & WHO Indicates 10 year risk of developing CVD while Gaziano GRS indicates 5 year risk of developing CVD.
Gaziano: Low <10%; Moderate >10% to <20%; High >20%
Framingham: Low 0%; Moderate >0% to <20%; High >20%
WHO: Low <10%; Moderate >10% to <30%; High >30%