Anal Incontinence during pregnancy and post-delivery amongst Indians and Black Africans: Prevalence and Predictors
Introduction

• A joint report by IUGA and the ICS\(^1\) defines anal incontinence (AI) as the unintentional loss of faeces or flatus.

• Faecal incontinence is a complaint of involuntary loss of solid or liquid faeces

• Flatal incontinence is a complaint of involuntary loss of flatus.

• normal continence arises from a complex coordinated process involving the anal canal high pressure zone, the ano-rectal sensation and reflexes, and the pelvic floor musculature \(^2,3\).
Introduction

- AI in women results in emotional, psychological and social problems which impact negatively on the quality of life of affected individuals\textsuperscript{4-6}.

- Prevalence rates vary
  - depending on the definitions used \textsuperscript{5-8}
  - from 13\% to 44\% between 6 weeks and 10 months post-partum, in primiparae and multiparae\textsuperscript{4,8,9}.

- Most studies highlight prevalence rates and predictors for AI in the context of labour, childbirth and anal sphincter injury (ASI) \textsuperscript{7,9-13}. 
Introduction

• Some women with ASI are continent, while others with intact sphincters are not- suggesting other factors are involved in the development of Al\textsuperscript{14}.

• AI in pregnancy varies from 3-29% \textsuperscript{11,15-17}.
  ➢ Hormonal changes in pregnancy
  ➢ the pressure of the gravid uterus impacts on the anatomic structure and neuromuscular function of the pelvic floor \textsuperscript{18-20}.

• Many of the problems associated with post-partum Al may be attributed to changes in ano-rectal function occurring in pregnancy\textsuperscript{11,16, 21}. 
Introduction

• Few prospective studies have looked at prevalence rates of AI during pregnancy and post-partum, most with a limited follow-up period\textsuperscript{16,22}.

• Much of the published data involves studies performed in populations from well-resourced countries.

• There is minimal data involving populations in low and middle income countries.

• Hence we performed this study in our population, which consists mainly of Zulu-speaking Black-Africans and Indians.
Method

Study Design, Setting and Population

• 2nd analysis of a prospective observational study looking at interracial variation in prevalence of AI,

• 2 regional hospitals, servicing the lower socioeconomic groups of the Durban Metropolitan Area

• 1254 Zulu speaking Black African and Indian women recruited over 3 months and followed for 6 months. 1248 cases were analyzed

• Exclusion criteria:
  – muscular
  – neurological
  – bowel disorders
  – ano-rectal pathology
  – incontinence
Method

Data Tool and Collection

• Participants answered questions regarding the symptoms of AI at 3 time points: antenatal, at 6 weeks and 6 months post-partum.
  – do you have difficulty controlling wind?
  – do your bowels leak liquid stool?
  – do your bowels leak solid stool?
• Anticipated responses were on a 5 point scale:
  – never, occasionally, sometimes, most of the time, all of the time.
Method

Data Tool and Collection

• Women reporting at least one symptom of incontinence of liquid or solid stools were classified as having faecal incontinence.
• Women reporting incontinence symptoms for both flatus and faeces were classified as having AI.
• The antenatal questions were administered in person, while the post-delivery questions were administered telephonically or through the mail.
• Obstetric data was captured on a structured data form.
• A single researcher administered the questionnaire, collected and captured all data.
Method

Data analysis:

• Analysed in SPSS version 21
• Flatal, faecal and AI - Dependent variables
• Continuous dependent variables - categorized around the median for use in bivariate and multivariate analyses.
• The Chi square test and binary logistic regression - used to identify significant associations
• All significant variables on bivariate analysis - included in the multivariate model.
• No multivariate analysis was possible at 6 months.
• The level of significance was 0.05 (α=0.05).
Method

Regulatory approvals:

• Institutional and hospital ethical approval were obtained from the relevant authorities

• all study participants provided written informed consent prior to entry into the study.
## Results

Maternal Demographics and Obstetric Characteristics at baseline (N=1248).

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Age (years)</th>
<th>24 (13-45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>69 (45-161)</td>
<td></td>
</tr>
<tr>
<td>Height (centimeters)</td>
<td>160 (140-180)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>1004 (80.4)</td>
<td></td>
</tr>
<tr>
<td>Indian</td>
<td>244 (19.6)</td>
<td></td>
</tr>
<tr>
<td>Social Status (high)</td>
<td>143 (11.5)</td>
<td></td>
</tr>
</tbody>
</table>

### Obstetric Characteristics

| Parity                        | 2 (1-11) |
| Induction of Labour (yes)     | 84 (6.7) |
| Duration of Labour (hours)    | 6.3 (1-70) |
| Augmentation (yes)            | 95 (7.6) |
| Episiotomy (yes)              | 444 (35.6) |
| Medio-lateral Episiotomy      | 418 (33.5) |
| Medical Episiotomy            | 26 (2.1) |
| Perineal Tears (yes)          | 202 (16.2) |
| 1st and 2nd Degree Tears      | 151 (12.1) |
| 3rd and 4th Degree Tears      | 51 (4.1) |
| Instrumentation (yes)         | 15 (1.2) |
| Forceps                       | 9 (0.7) |
| Vacuum                        | 6 (0.5) |
| Epidural (yes)                | 186 (14.9) |
| Baby Birth weight (kg)        | 3 (0.6-5.2) |

Values are presented as median (range) or n (%)
Results

Frequency of flatal, faecal and AI late in pregnancy, six weeks post-delivery and six months post-delivery, (n=1248). Values are presented as n (%)
# Results

Bivariate Analysis of Demographics, Obstetric Characteristics and Flatal and Faecal Incontinence at 6 weeks post-delivery, (n=1136). Values are presented as odds ratios (95% CI)

<table>
<thead>
<tr>
<th></th>
<th>N=573</th>
<th>Flatal Incontinence</th>
<th>N=942</th>
<th>Faecal Incontinence</th>
<th>N=1004</th>
<th>Anal Incontinence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (≥24 years)</td>
<td>318</td>
<td>0.9 (0.7-1.2)</td>
<td>530</td>
<td>1.0 (0.7-1.3)</td>
<td>567</td>
<td>1.1 (0.7-1.5)</td>
</tr>
<tr>
<td>Weight (≥69 kg)</td>
<td>288</td>
<td>1.0 (0.8-1.3)</td>
<td>475</td>
<td>1.1 (0.8-1.5)</td>
<td>509</td>
<td>1.3 (0.9-1.8)</td>
</tr>
<tr>
<td>Height (≥160 cm)</td>
<td>486</td>
<td>1.2 (0.9-1.6)</td>
<td>787</td>
<td>0.9 (0.6-1.4)</td>
<td>836</td>
<td>0.7 (0.4-1.3)</td>
</tr>
<tr>
<td>Race (African)</td>
<td>479</td>
<td>1.7 (1.3-2.3)**</td>
<td>760</td>
<td>1.7 (1.2-2.4)*</td>
<td>807</td>
<td>1.8 (1.2-2.7)*</td>
</tr>
<tr>
<td>Social Status (high)</td>
<td>56</td>
<td>0.7 (0.5-1.0)</td>
<td>112</td>
<td>1.2 (0.7-2.1)</td>
<td>117</td>
<td>1.1 (0.6-2.0)</td>
</tr>
<tr>
<td><strong>Obstetric Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity (≥2)</td>
<td>325</td>
<td>1.0 (0.8-1.2)</td>
<td>542</td>
<td>1.2 (0.8-1.6)</td>
<td>573</td>
<td>1.0 (0.7-1.5)</td>
</tr>
<tr>
<td>Induction of Labour (yes)</td>
<td>45</td>
<td>1.4 (0.9-2.2)</td>
<td>64</td>
<td>0.9 (0.5-1.7)</td>
<td>69</td>
<td>1.0 (0.5-2.1)</td>
</tr>
<tr>
<td>Duration of Labour (≥6.3 hours)</td>
<td>295</td>
<td>1.1 (0.9-1.4)</td>
<td>470</td>
<td>1.0 (0.7-1.3)</td>
<td>508</td>
<td>1.2 (0.9-1.7)</td>
</tr>
<tr>
<td>Augmentation (yes)</td>
<td>49</td>
<td>1.2 (0.8-1.8)</td>
<td>77</td>
<td>1.2 (0.6-2.1)</td>
<td>80</td>
<td>1.0 (0.5-1.8)</td>
</tr>
<tr>
<td>Episiotomy (yes)</td>
<td>206</td>
<td>1.0 (0.8-1.2)</td>
<td>341</td>
<td>0.9 (0.7-1.3)</td>
<td>367</td>
<td>1.0 (0.7-1.5)</td>
</tr>
<tr>
<td>Episiotomy Type (Medio-lateral)</td>
<td>195</td>
<td>1.3 (0.6-3.0)</td>
<td>321</td>
<td>1.0 (0.3-2.8)</td>
<td>346</td>
<td>1.1 (0.3-4.0)</td>
</tr>
<tr>
<td>Tear (yes)</td>
<td>90</td>
<td>1.0 (0.7-1.4)</td>
<td>155</td>
<td>1.4 (0.9-2.2)</td>
<td>164</td>
<td>1.5 (0.9-2.7)</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;/4&lt;sup&gt;th&lt;/sup&gt; degree tear</td>
<td>28</td>
<td>1.3 (0.7-2.5)</td>
<td>43</td>
<td>0.7 (0.3-1.9)</td>
<td>47</td>
<td>1.1 (0.3-3.6)</td>
</tr>
<tr>
<td>Instrumentation (yes)</td>
<td>8</td>
<td>1.1 (0.4-3.1)</td>
<td>12</td>
<td>0.8 (0.2-2.9)</td>
<td>14</td>
<td>1.9 (0.2-14.2)</td>
</tr>
<tr>
<td>Instrumentation (Forceps)</td>
<td>5</td>
<td>1.3 (0.2-9.9)</td>
<td>7</td>
<td>0.7 (0.1-10.0)</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>Epidural (yes)</td>
<td>84</td>
<td>1.0 (0.7-1.3)</td>
<td>150</td>
<td>1.7 (1.1-2.9)*</td>
<td>156</td>
<td>1.7 (0.9-3.1)</td>
</tr>
<tr>
<td>Baby Birth weight (≥3kg)</td>
<td>286</td>
<td>0.9 (0.7-1.2)</td>
<td>481</td>
<td>1.1 (0.8-1.5)</td>
<td>509</td>
<td>1.0 (0.7-1.4)</td>
</tr>
</tbody>
</table>

Chi square, α=0.05, *p<0.05; **p<0.001
## Results

Table 4: Multivariate Analysis of Demographics, Obstetric Characteristics and Flatal and Faecal Incontinence at 6 weeks post delivery, (n=1136). Values are presented as odds ratios (95% CI)

<table>
<thead>
<tr>
<th>Model</th>
<th>Flatal Incontinence*</th>
<th>Faecal Incontinence*</th>
<th>Anal Incontinence*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1**</td>
<td>Model2***</td>
<td>Model 3****</td>
</tr>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age (≥24 years)</strong></td>
<td>1.0 (0.7-1.3)</td>
<td>1.0 (0.7-1.3)</td>
<td>1.0 (0.7-1.3)</td>
</tr>
<tr>
<td><strong>Weight (≥69 kg)</strong></td>
<td>1.0 (0.8-1.3)</td>
<td>1.0 (0.8-1.3)</td>
<td>1.0 (0.8-1.3)</td>
</tr>
<tr>
<td><strong>Height (≥160 cm)</strong></td>
<td>1.2 (0.9-1.7)</td>
<td>1.2 (0.9-1.7)</td>
<td>1.2 (0.9-1.7)</td>
</tr>
<tr>
<td><strong>Race (African)</strong></td>
<td>1.8 (1.3-2.5)</td>
<td>1.8 (1.3-2.5)</td>
<td>1.8 (1.3-2.5)</td>
</tr>
<tr>
<td><strong>Obstetric Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parity (≥2)</strong></td>
<td>1.0 (0.8-1.3)</td>
<td>1.0 (0.9-1.3)</td>
<td>1.0 (0.7-1.3)</td>
</tr>
<tr>
<td><strong>Induction of Labour (yes)</strong></td>
<td>1.4 (0.9-2.2)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Duration of Labour (≥6.3hrs)</strong></td>
<td>1.1 (0.9-1.4)</td>
<td>1.1 (0.9-1.4)</td>
<td>1.1 (0.9-1.4)</td>
</tr>
<tr>
<td><strong>Augmentation (yes)</strong></td>
<td>-</td>
<td>1.1 (0.7-1.8)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Episiotomy (yes)</strong></td>
<td>1.1 (0.9-1.5)</td>
<td>1.1 (0.8-1.5)</td>
<td>1.1 (0.8-1.5)</td>
</tr>
<tr>
<td><strong>Tear (yes)</strong></td>
<td>0.9 (0.8-1.3)</td>
<td>0.9 (0.7-1.3)</td>
<td>0.9 (0.7-1.3)</td>
</tr>
<tr>
<td><strong>Instrumentation (yes)</strong></td>
<td>1.2 (0.4-3.3)</td>
<td>1.2 (0.4-3.4)</td>
<td>1.2 (0.4-3.5)</td>
</tr>
<tr>
<td><strong>Epidural (yes)</strong></td>
<td>-</td>
<td>-</td>
<td>1.0 (0.7-1.4)</td>
</tr>
<tr>
<td><strong>Baby Birth weight (≥3kg)</strong></td>
<td>0.9 (0.7-1.2)</td>
<td>0.9 (0.7-1.2)</td>
<td>0.9 (0.7-1.2)</td>
</tr>
</tbody>
</table>

*Model included Age (≥24years), Weight(≥69kg), Height (≥160cm), Race (African), Parity(≥2), Duration of Labour (≥6.3hours), Episiotomy(yes), Tear (yes), Instrumentation(yes), Baby Birth Weight (≥3kg)

**Model included "induction of labour"

***Model included “augmentation”

****Model included “epidural”
Discussion

Prevalence of AI

• High prevalence of AI in the antenatal period.

• Women were more incontinent late in pregnancy than 6 months after delivery.

• Our findings suggest that pregnancy itself may be a risk factor for AI.
  - Chaliha et al. in 2001
  - MacLennan et al. in 2003
  - van Brummen et al. In 2006
  - O’Boyle et al. in 2008
  - Olsen et al. in 2012

• Many of the problems associated with post-partum changes in pelvic floor mobility may be attributed to biomechanical changes occurring in pregnancy
  - Diets et al. in 2006 \(^{21}\)
Prevalence of AI

• The high prevalence of AI in our study could be a reflection of the lower socioeconomic status of the majority of the study population!
  ➢ Johannessen et al.24 in 2013
• Our findings are similar to studies which report prevalence rates of 13% to 25% at 3 to 6 months, with a decline to 1 to 6% by 12 months.
  ➢ Donnelly et al. 1998
  ➢ Chaliha et al. 1999
  ➢ Pollack et al. 2004
  ➢ Melville et al. 2006
  ➢ Guise et al. 2006
• Differs from those of O’Boyle et al. 2008
Discussion

Race
• The significant difference in the incidence of AI:
  ➢ in diet,
  ➢ perineal anatomy,
  ➢ and differing body type.
• Differences in the aetiology and pathogenesis of urinary incontinence and genital prolapse between the Black- African and White South Africans have been highlighted
  ➢ Knobel 1975 &. Van Dongen 1981
• Anatomical differences highlighted by Hoyte et al. 2005
• Huang et al. 2006 a lower AI incidence amongst Asian-American women compared to White-Americans (21% vs. 29 %, P=0.007).
• May be ethnic or interracial variation
Discussion

Obstetric Predictors

Epidural:

• A significant association between epidural analgesia (EDA) and AI

• Controversial evidence regarding EDA and AI

• Earlier studies
  ➢ . Donnelly et al. 1998 & Zetterstrom et al. 1999

• More recently
  ➢ Meyer et al. 2002

• Found no difference in pelvic floor dysfunction post-delivery

• Is it the EDA itself or factors behind the woman’s requirement for the EDA (long standing labour, pain due to characteristics of her pelvic floor) that increases the risk of AI?
Discussion

Episiotomy:

• No significant association between episiotomy and AI.

• The evidence relating to episiotomy and AI vary.
  - Signorello et al. 2000 & Dannecker et al. 2005 episiotomy as a risk factor for AI.
  - Chiarelli et al. 2005, and Handa et al. 2013 found no association

• The type of episiotomy also determines the rate of sphincter injury and subsequent incontinence.
  - Coats et al. 1998 - that 11.6% of midline episiotomies had rectal extension vs. 2% of medio-lateral
  - Gass et al. 1986 - 1.2% incidence of anal sphincter injury with midline episiotomy.

• We do not practice routine episiotomy use, and if required a right medio-lateral is performed.
Discussion

Tears

- No significant association between third or fourth degree tears and AI.
- May be attributed to the low prevalence (4.1%) of third and fourth degree tears.
  - Zettersrom et al. 1999 found a significant association
  - Bols et al. 2010 showed a third or fourth degree tear was the only factor strongly associated with AI.

- Is the strong focus on sphincter tears as the only reason for AI wrong?

- Might it be that the pelvic floor is more important for maintaining continence?
  - Roos et al. 2010
Discussion

Instrumental delivery

- No significant association between instrumental delivery and AI
- 1.4% women who had AI at 6 weeks - resolution of symptoms at 6 months.
  - Donelly et al.\textsuperscript{10} - instrumentation carried the greatest risk for ASI and AI at 6 weeks.
  - Zetterstrom et al\textsuperscript{9} identified instrumental delivery as a significant risk factor at 5 months post-partum but not at 9 months
  - Chiarelli et al\textsuperscript{35} in their year long follow-up study showed no association between instrumental delivery and AI

- There may be an improvement in symptoms with a return to normal.
- It remains to be established whether it is caused by the indication for its assignment or by the procedure itself?
Discussion

Augmentation/Induction of Labour
• No significant association between augmentation or induction of labour
  ➢ Donnelly et al. 1998

Duration of labour and Maternal Weight
• A duration of labour ≥ 6.3 hours was significantly associated with AI on bivariate
  ➢ Zettersromet al. 1999 showed that duration of labour > 12 hours was significantly associated with AI post-partum.

• Studies show a significant association between prolonged second stage and AI\textsuperscript{9,10}.

• No significant association between maternal weight and AI.
  ➢ Bols et al. 2010 - no association between maternal body mass index and post-partum AI.
Discussion

Limitations

• Reliance on self-reporting of symptoms may have introduced recall bias.

• The use of a standardised validated questionnaire leaves us fairly confident that the prevalence of incontinence reported in our study population was a reflection of the true prevalence.

• The strength of this study is the longitudinal set-up combined with a large population.
Conclusion

• Difficulties in determining the influence of the various etiological factors for AI.

• This study reports time trends showing marked resolution of symptoms with prolonged follow-up.

• Highlights the need for further evaluation of differing AI incidences based on race which may guide future practice with respect to prevention and management of this distressing condition.

• Physiological and anatomical changes during pregnancy persist in some women and explains why they are still incontinent, rather than the obstetrical factors or, is it a combination of the two that results in AI?
Acknowledgements

• The study was supported by a University of KwaZulu-Natal Competitive Research grant and a research grant from the South African Society of Obstetricians and Gynaecologists.

• The authors would like to thank Dr Saloshni Naidoo, School of Nursing and Public Health, University of KwaZulu-Natal for her assistance with the statistical analysis.