The prevalence of faecal incontinence: a systematic review

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The prevalence of faecal incontinence within the community: a systematic review

Abstract

Aims: To quantify the prevalence of faecal incontinence in the Australian population by deriving age and gender-specific rates of urinary incontinence from the literature and applying them to the Australian population.

Materials and Methods: Systematic review of the literature pertaining to the prevalence of urinary incontinence from 1995 onward.

Setting: Only studies of the prevalence of community based faecal incontinence were included.

Included studies: The following a priori inclusion criteria were applied: community based sampling frame, response rate >65%, >125 participants per gender group, age and gender separation of results (stratification), used a validated instrument to measure incontinence.

Results: The age and gender stratified prevalence of faecal incontinence in community dwelling adults was calculated using a random effects model. Overall prevalence of female faecal incontinence was estimated to be 5.3% in Australian women, and 5.5% in Australian men. When applied to population estimates it is estimated that there are 514,708 males and 505,376 females incontinent of faeces in Australia.

Conclusions: it is disappointing that there is still a lack of high quality, basic descriptive epidemiology of this important health problem. The results of this
systematic review allow for some quantification of the prevalence of faecal incontinence and provide evidence to support the fact that there appears to be no difference in prevalence of faecal incontinence in community dwelling adults between males and females.

**Keywords:** Faecal incontinence, epidemiology, prevalence
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Introduction

The development of faecal incontinence has a very significant impact upon the lives of affected individuals and their carers. While faecal incontinence is a devastating symptom, there appears to be a paucity of data examining the prevalence of faecal incontinence in the general population.

In order to develop effective strategies for the prevention and management of faecal incontinence and to provide health care facilities and resources for sufferers of faecal incontinence and those who care for them, it is important to be able to estimate the prevalence of faecal incontinence with some degree of accuracy. While extensive reviews of the epidemiological literature pertaining to urinary incontinence have been undertaken, [1-3] there would appear to be no reviews pertaining to the prevalence of faecal incontinence.

A number of factors will impact on the estimate of the prevalence of faecal incontinence in the general community; these include the populations studied, the age group studied, the sampling method used, the assessment instrument used, and other specific aspects of study methodology.

Systematic reviews provide the methodology whereby a rigorous summary of the literature can be undertaken. Although meta-analysis of randomised controlled trials is usually undertaken, meta-analysis of observational studies
is being increasingly undertaken and guidelines for undertaking such analyses have been developed [4].

We undertook a systematic review of the literature with the aim of answering the following question: What is the prevalence of faecal incontinence in the Australian community? We attempted to derive age and gender-specific rates of faecal incontinence from the literature and apply them to the Australian population.

**Method**

**Search strategy**

An experienced research officer undertook the literature search (AW). Both Medline and Embase databases were searched. Key words common to those cited in previous reviews of the literature were used as search terms:

- Faecal (faecal) incontinence (MeSH heading) OR
- bowel control (text word) OR
- prevalence, incidence, epidemiology, OR natural history (MeSH heading).

Reference lists from retrieved studies and conference proceedings were examined for any studies that might not have been retrieved by the database searches. The search was limited to studies of adults (>18yrs old) published in English. Only studies published after 1995 were included in the search,
since awareness, reporting, and patterns of disease may have differed significantly before then.

The search provided a total of 31 abstracts: 18 abstracts from the Medline database, 10 from the Embase database and 3 from references lists. Twenty-three abstracts were culled from further consideration for the following reasons: six were repeats, nine made general comments about faecal incontinence, one studied the risk factors associated with faecal incontinence, two studied faecal incontinence in a specific group of people, four were studies of faecal incontinence or related combined symptoms of urinary and faecal incontinence and one was a measures study. Copies of the remaining eight studies were obtained and underwent initial scrutiny.

Study Selection
We applied the following a priori inclusion criteria:

a) community based sampling frame
b) response rate >65%
c) >125 participants per gender group
d) self report of symptoms
e) used a validated instrument to measure incontinence

Two reviewers with content expertise (PC and WB) reviewed the 8 papers in duplicate and independently; disagreements were resolved by an adjudicator (JA).
A further 4 studies were excluded for the following reasons: two did not have study populations that were considered to be entirely cross-sectional/community based [5, 6], one used a third party to respond to survey questions [7], one reported data in a manner that did not allow any data extraction [8]. Although three papers reported data in a manner that did not allow extraction by age and gender [9-11], all three study groups complied with a request to provide this stratified information. Thus, four studies entered the analysis [9-12].

**Data extraction**

Data was extracted on the following: population, study characteristics, definition of incontinence and time frame for incontinence. Age- and gender-stratified prevalences were extracted for each study by 10-year age groups.

**Statistical analysis**

Prevalences were pooled across each of the age and gender strata. The Q-test was adapted for proportions and used to test for heterogeneity before pooling across strata, as follows:

\[
Q = \sum W_i (p_i - \bar{p})^2
\]

where

\(W_i\) is the weight of each study, given by the inverse of the variance
\( p_i \) is the prevalence in study \( i \)

\( \bar{p} \) is the mean prevalence across all studies

The Q-statistic follows a chi-square distribution with \((k-1)\) degrees of freedom.
Threshold of significance was taken as \( p<.10 \).

A random effects model was then used to pool the age and gender stratified estimates using the following formula:

\[
\bar{p}^* = \frac{\sum W_i^* p_i}{\sum W_i^*}
\]

where

\( \bar{p}^* \) is the pooled prevalence

\( p_i \) is the prevalence in study \( i \), and

\( W_i^* \) is the weight of each study, given by:

\[
W_i^* = \frac{1}{\text{var}(p_i) + D}
\]

where

\[
D = \frac{Q - (k - 1)}{U} \quad \text{if } Q > k - 1 \quad \text{or} \quad D = 0 \quad \text{otherwise}
\]

\( k \) is the number of studies

and
\[ U = \sum W_i - \left( \frac{\sum W_i^2}{\sum W_i} \right) \]

The 95% C.I. for population effect size is:

\[ \left( \hat{p} - \frac{1.96}{\sqrt{\sum W_i^*}}, \hat{p} + \frac{1.96}{\sqrt{\sum W_i^*}} \right) \]

The results of this analysis were then applied to the age stratified Australian National Population Statistics to provide an estimate of the prevalence of faecal incontinence in the Australian populations. [13]

**Results**

*Female faecal incontinence*

Table 1 lists the characteristics of all included studies with data on faecal incontinence in both genders. Of the 4 studies, all were in Caucasian populations. The overall prevalence of incontinence ranged from approximately 1.3% to 25%, although this partly reflects the varying age ranges in the studies. Table 2 lists the age-specific prevalences in tabular form and Figures 1 and 2 in graphic form. The Q-test indicated homogeneity in age groups <30, 30-39, 40-49 and 80+ age groups. There was heterogeneity in age groups 50-59, 60-69 and 70-79. The source of this heterogeneity was not apparent, and exploration of the definition of
incontinence and time frame of incontinence (e.g. in the last year or current) failed to account for heterogeneity.

Applying these age-stratified estimates to the Australian population leads to an estimate of the prevalence of faecal incontinence of 5.3% among Australian women, or an anticipated half a million women with some degree of incontinence (Table 3). The validity of this estimate however is tempered by the fact that there was some heterogeneity at the study level that could not be explained; hence we cannot be absolutely confident about this estimate.

**Male faecal incontinence**

Table 1 lists the characteristics of all included studies with data on faecal incontinence in males. The overall prevalence of faecal incontinence in males ranged from approximately 0.5% to 56.3%. Figure 1 lists the age-specific prevalences in tabular form and figure 2 in graphic form. Prevalences were homogeneous in age groups <30, 30-39, and 40-49, but heterogeneous in age groups 50-59, 60-69, 70-79 and 80+. As before, the source of this heterogeneity was not apparent; exploration of definition of incontinence and time frame of incontinence (e.g. in the last year or current) failed to account for heterogeneity. Pooling, despite heterogeneity, using the random effects model yielded the age-specific prevalences listed in Table 3; the prevalence ranged from 3.4% in males aged less than 30 years old, to 23% in over 80 year olds.
Applying these age-stratified estimates to the Australian population leads to an estimate of the prevalence of faecal incontinence of 5.5% among Australian men, or an anticipated 514,708 men with some degree of incontinence (Table 3). The validity of this estimate is tempered by the fact that there was some heterogeneity at the study level, which could not be explained; hence we cannot be absolutely confident about this estimate.

Discussion

We have systematically reviewed the literature with a view to answering the question: What is the prevalence of faecal incontinence in the Australian community? We limited ourselves to high quality, reasonably large, community-based studies with high response rates, in order to avoid potential biases. Nevertheless, our study has some limitations:

a) We did not include results from abstracts or search for unpublished studies (so-called “grey literature”).

b) There was no method available to assess publication bias. However, since these studies focused on prevalence estimates and not effect sizes, there is no reason to believe that they would be subject to the same publication bias, i.e. studies with positive results are more likely to be published than those with negative results.
Despite these limitations, this represents the first meta-analysis of the prevalence of faecal incontinence in the literature. We estimate that there are over 1 million Australian community dwelling adults with some degree of faecal incontinence. The prevalence of incontinence increases with age; it is roughly 7-8 fold higher in the over 80 age group compared to the under 30 age group in both genders, although the absolute values appear to be slightly higher in men than women.

While there is controversy surrounding gender differences in the prevalence of faecal incontinence, the results of this analysis add more support to the evidence which appears to show no clear epidemiological difference between the prevalence of faecal incontinence in men and women. Women are traditionally thought to experience faecal incontinence significantly more commonly than men [7, 12, 14] but other studies have shown similar or higher prevalence in men [10, 16, 17]. Colorectal surgeons reportedly perform the surgical correction of faecal incontinence far more commonly on women than men. It is interesting to note that, according to these estimates, twice as many men suffer from faecal incontinence compared to urinary incontinence, whereas the numbers are reversed for women; more than 3 times as many women suffer from urinary incontinence compared to faecal incontinence. Overall, faecal incontinence affects half as many people as urinary incontinence. Studies of the prevalence of faecal incontinence in nursing homes and institutions has been estimated to be between 3.1% for faecal incontinence alone, and 17.7% for the combined symptoms of FI and urinary incontinence (UI) concurrently. [18]
Although we were able to generate these age-stratified prevalences and estimate the magnitude of faecal incontinence in the Australian community, these summary numbers must be taken cautiously for a number of reasons:

a) We pooled the results despite some heterogeneity. Pooling can be done using fixed or random effects models. The fixed effects model answers the question of whether the treatment or risk factor had an effect in all the studies that were done, and hence includes only within-study variance terms. The random effects model assumes that the studies done are a random sample of all possible studies, and answers the question of whether the treatment or risk factor will have an effect on average; this model therefore incorporates between-study variance terms. Common practice is to pool using a fixed effects model when studies are homogeneous, and to use a random effects model when there is heterogeneity. The latter however has been discouraged by methodologists [19-20]; the main focus should be on trying to understand the sources of heterogeneity rather than providing a possibly meaningless summary measure. [21]

b) The pooled studies reflect differing definitions and severities of incontinence. Hence we cannot say whether the pooled estimate reflects the prevalence of mild, moderate or severe incontinence,
nor whether it reflects current incontinence, or incontinence at any
time.

c) The studies provide insufficient description of potential confounders

Health policy decision makers require a clear description of the magnitude
and distribution of a health or disease state and we are forced to conclude
that there is insufficient information to provide this. Our pooled estimate is a
useful start but is not particularly helpful for decision-making; the woman with
transient incontinence immediately following childbirth requires different
resources than a nursing home patient with dementia and incontinence.

It was disappointing to find few scientifically robust studies reported in the
literature. The recommendations made by the International Continence
Society (ICS) for further studies of urinary incontinence prevalence studies
should also underpin any further studies of the prevalence of faecal
incontinence:

a) Studies should use a validated definition of faecal incontinence that would
allow comparisons across studies in different settings and cultures. The
ICS recommends that further prevalence studies should only be performed
with recommended and validated questionnaires, but gives no examples.
The ICS further recommend that there should be standardisation of
measurement instruments for measuring faecal incontinence in the
community.
b) With respect to epidemiological research, that the following elements be included in the definition: The individual’s statement of any faecal loss, the frequency of loss, the quantity of faeces lost and the duration of the condition.

c) Not to include quality of life or “bother” in the definition of faecal incontinence for epidemiological studies in order that patients’ perceptions not be allowed to distort prevalence estimates or limit the detection of risk factors.

d) Collecting comprehensive information about confounders, such as concurrent urinary incontinence in both genders. In women assisted vaginal delivery [22] followed in the short or long term with complaints of constipation and straining to void [23, 24] might be seen as confounders, while in men, confounding factors might include obstructed defaecation and self-report of constipation [10].

In conclusion, it is disappointing that there were not more studies published in this area. There is still a lack of high quality, basic descriptive epidemiology of this important health problem, and what studies are available do not express results in a manner that allows informed policy making or health resource allocation. A study tailored to these needs would make a significant contribution in the field of continence research.
References


<table>
<thead>
<tr>
<th>First Author</th>
<th>Country</th>
<th>Age range in years</th>
<th>Female and male n=</th>
<th>Definition of incontinence used in the study</th>
<th>Validation status</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kalantar</td>
<td>Australia</td>
<td>50 – 80+</td>
<td>♂ 363 ♂ 297</td>
<td>Involuntary release of liquid or solid faeces at inappropriate times or places. Excluding that associated with illness.</td>
<td>Validated</td>
<td>In the last year</td>
</tr>
<tr>
<td>Lam</td>
<td>Australia</td>
<td>24 – 99</td>
<td>♂ 359 ♂ 259</td>
<td>Stool leakage &lt; once weekly or &gt;once weekly</td>
<td>Validated</td>
<td>Current experience</td>
</tr>
<tr>
<td>MacLennan</td>
<td>Australia</td>
<td>15 - 97</td>
<td>♂ 1544 ♂ 1465</td>
<td>Loss of control of motions.</td>
<td>Not validated</td>
<td>Ever</td>
</tr>
<tr>
<td>Roberts</td>
<td>United States</td>
<td>50 – 80+</td>
<td>♂ 755 ♂ 206</td>
<td>Accidents or soiling (liquid or solid) because of the inability to control the passage of stool until you reach the toilet</td>
<td>Not validated</td>
<td>In the previous year.</td>
</tr>
</tbody>
</table>
Table 2. Age specific prevalence: female faecal incontinence

<table>
<thead>
<tr>
<th>Study</th>
<th>Kalantar</th>
<th>2.9</th>
<th>9.0</th>
<th>13.5</th>
<th>12.1</th>
<th>13.8</th>
<th>20.0</th>
<th>25.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Lam</td>
<td>5.3</td>
<td>5.2</td>
<td>7.5</td>
<td>16.7</td>
<td>17.0</td>
<td>12.7</td>
<td>15.2</td>
</tr>
<tr>
<td>26</td>
<td>MacLennan</td>
<td>1.3</td>
<td>2.0</td>
<td>4.3</td>
<td>4.1</td>
<td>8.2</td>
<td>3.8</td>
<td>8.3</td>
</tr>
<tr>
<td>37</td>
<td>Roberts</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>13.2</td>
<td>17.2</td>
<td>12.8</td>
<td>21.1</td>
</tr>
</tbody>
</table>
Table 3. Estimated prevalence of faecal incontinence in Australia
(Random Effects Model)

<table>
<thead>
<tr>
<th>Age group</th>
<th>Australian Population*</th>
<th>Proportion of Incontinence^</th>
<th>Prevalence of Incontinence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>&lt;30</td>
<td>4,124,057</td>
<td>3,955,312</td>
<td>0.034</td>
</tr>
<tr>
<td>30-39</td>
<td>1,453,036</td>
<td>1,459,572</td>
<td>0.082</td>
</tr>
<tr>
<td>40-49</td>
<td>1,372,212</td>
<td>1,373,537</td>
<td>0.072</td>
</tr>
<tr>
<td>50-59</td>
<td>1,078,134</td>
<td>1,042,819</td>
<td>0.109</td>
</tr>
<tr>
<td>60-69</td>
<td>711,364</td>
<td>725,572</td>
<td>0.102</td>
</tr>
<tr>
<td>70-79</td>
<td>502,525</td>
<td>611,470</td>
<td>0.125</td>
</tr>
<tr>
<td>80+</td>
<td>183,982</td>
<td>343,574</td>
<td>0.231</td>
</tr>
<tr>
<td>Total</td>
<td>9,425,310</td>
<td>9,511,856</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1. Percentage of females with incontinence for all studies

Figure 2. Percentage of males with incontinence for all studies