Migraine in the 21st Century: Lessons from Epidemiologic Studies

Marcelo E. Bigal, M.D.; Ph.D.

Global Director for Scientific Affairs — Neuroscience
Merck Research Laboratories

Dept of Neurology, Albert Einstein College of Medicine
Overview

• To review the epidemiology of migraine. Is migraine worth attention?
• To review the burden of migraine on the individual, family and society. Is migraine worth recognition?
• To estimate patterns of diagnosis and treatment for migraine, as well as barriers for care
• To discuss the prognosis of migraine
Epidemiology Lesson 1

Migraine peaks with incidents in the teens and early twenties

Accordingly, first migraine attacks often happen in childhood or puberty
Migraine, Incidence


Incidents per 1000 person-years

Age at Onset

Female

Male
Epidemiology Lesson 2

Migraine is Very Prevalent
Prevalence in adults worldwide: 1-year prevalence

Population or community-based surveys of >500 participants covering ages 25-60 y, using IHS or modified IHS criteria

<table>
<thead>
<tr>
<th>Region</th>
<th>Prevalence</th>
<th>Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>4.0 (2 studies)</td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td>10.6 (6 studies)</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>10.6 (6 studies)</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>13.8 (9 studies)</td>
<td></td>
</tr>
<tr>
<td>N. America</td>
<td>12.6 (8 studies)</td>
<td></td>
</tr>
<tr>
<td>S. America</td>
<td>9.6 (10 studies)</td>
<td></td>
</tr>
</tbody>
</table>

Mean: 11.2
Median: 10.2

In the US migraine affects over 12% of the adults.

Migraine is the most common neurological disease in men (6%).

Migraine is 3 times more common in women (18%).

Prevalence peaks in adulthood, coinciding with the peak of work productivity.
Migraine is very common in US. Results of 3 large studies conducted 15 years apart

Migraine is Most Common in Women and During Peak Productive Years

Epidemiology Lesson 4

The Burden of Migraine is Severe and Complex
Burdens of One Person’s Migraine

- Pain and suffering
- Lifestyle compromise
- Patienthood
- Personal financial costs
- Anxiety
- Co-morbidity
- Employer & work colleagues
- Family burden
- Societal burden
The burden of migraine is severe and affects:

- **Burden on Individual:**
  - *Health-related quality of life*
  - *Disability*
  - *Interictal burden of migraine*

- **Burden on the family:**
  - *Migraine affects relationships*

- **Burden on society:**
  - *Costs*
### Burden on the Individual - Leading Causes of Years of Life Lost to Disability (YLDs) – WHO Report

<table>
<thead>
<tr>
<th>Both sexes, all ages</th>
<th>% total</th>
<th>Males, all ages</th>
<th>% total</th>
<th>Females, all ages</th>
<th>% total</th>
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</thead>
<tbody>
<tr>
<td>1 Unipolar depressive disorders</td>
<td>11.9</td>
<td>1 Unipolar depressive disorders</td>
<td>9.7</td>
<td>1 Unipolar depressive disorders</td>
<td>14.0</td>
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<tr>
<td>2 Hearing loss, adult onset</td>
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<td>2 Alcohol use disorders</td>
<td>5.5</td>
<td>2 Iron-deficiency anaemia</td>
<td>4.9</td>
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<tr>
<td>3 Iron-deficiency anaemia</td>
<td>4.5</td>
<td>3 Hearing loss, adult onset</td>
<td>5.1</td>
<td>3 Hearing loss, adult onset</td>
<td>4.2</td>
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<tr>
<td>4 Chronic obstructive pulmonary disease</td>
<td>3.3</td>
<td>4 Iron-deficiency anaemia</td>
<td>4.1</td>
<td>4 Osteoarthritis</td>
<td>3.5</td>
</tr>
<tr>
<td>5 Alcohol use disorders</td>
<td>3.1</td>
<td>5 Chronic obstructive pulmonary disease</td>
<td>3.8</td>
<td>5 Chronic obstructive pulmonary disease</td>
<td>2.9</td>
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<tr>
<td>6 Osteoarthritis</td>
<td>3.0</td>
<td>6 Falls</td>
<td>3.3</td>
<td>6 Schizophrenia</td>
<td>2.7</td>
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<tr>
<td>7 Schizophrenia</td>
<td>2.8</td>
<td>7 Schizophrenia</td>
<td>3.0</td>
<td>7 Bipolar affective disorder</td>
<td>2.4</td>
</tr>
<tr>
<td>8 Falls</td>
<td>2.8</td>
<td>8 Road traffic accidents</td>
<td>2.7</td>
<td>8 Falls</td>
<td>2.3</td>
</tr>
<tr>
<td>9 Bipolar affective disorder</td>
<td>2.5</td>
<td>9 Bipolar affective disorder</td>
<td>2.6</td>
<td>9 Alzheimer's and other dementias</td>
<td>2.2</td>
</tr>
<tr>
<td>10 Asthma</td>
<td>2.1</td>
<td>10 Osteoarthritis</td>
<td>2.5</td>
<td>10 Obstructed labour</td>
<td>2.1</td>
</tr>
<tr>
<td>11 Congenital abnormalities</td>
<td>2.1</td>
<td>11 Asthma</td>
<td>2.3</td>
<td>11 Cataracts</td>
<td>2.0</td>
</tr>
<tr>
<td>12 Perinatal conditions</td>
<td>2.0</td>
<td>12 Perinatal conditions</td>
<td>2.2</td>
<td>12 Migraine</td>
<td>2.0</td>
</tr>
<tr>
<td>13 Alzheimer's and other dementias</td>
<td>2.0</td>
<td>13 Congenital abnormalities</td>
<td>1.9</td>
<td>13 Congenital abnormalities</td>
<td>1.9</td>
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<tr>
<td>14 Cataracts</td>
<td>1.9</td>
<td>14 Cataracts</td>
<td>1.9</td>
<td>14 Asthma</td>
<td>1.8</td>
</tr>
<tr>
<td>15 Road traffic accidents</td>
<td>1.8</td>
<td>15 Protein–energy malnutrition</td>
<td>1.8</td>
<td>15 Perinatal conditions</td>
<td>1.8</td>
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<tr>
<td>16 Protein–energy malnutrition</td>
<td>1.7</td>
<td>16 Alzheimer's and other dementias</td>
<td>1.8</td>
<td>16 Chlamydia</td>
<td>1.8</td>
</tr>
<tr>
<td>17 Cerebrovascular disease</td>
<td>1.7</td>
<td>17 Cerebrovascular disease</td>
<td>1.7</td>
<td>17 Cerebrovascular disease</td>
<td>1.8</td>
</tr>
<tr>
<td>18 HIV/AIDS</td>
<td>1.5</td>
<td>18 HIV/AIDS</td>
<td>1.6</td>
<td>18 Protein–energy malnutrition</td>
<td>1.6</td>
</tr>
<tr>
<td>19 Migraine</td>
<td>1.4</td>
<td>19 Lymphatic filariasis</td>
<td>1.6</td>
<td>19 Abortion</td>
<td>1.6</td>
</tr>
<tr>
<td>20 Diabetes mellitus</td>
<td>1.4</td>
<td>20 Drug use disorders</td>
<td>1.6</td>
<td>20 Panic disorder</td>
<td>1.6</td>
</tr>
</tbody>
</table>

The Burden of Migraine is Not Restricted to the Attack – The Interictal Burden

Symptom Burdens

- **During attacks**
  - pain and suffering, leading to
  - reduced functional ability

- **Beyond the attack**
  - fear of the next attack, leading to
  - avoidance behaviour and
  - lifestyle compromise
The Family Impact of Migraine – Migraine Damages Relationships With Sufferer’s Partner

USA and UK populations (245 migraine sufferers, 100 partners)

- Less able to communicate: From the sufferers’ perspective, 73% affected; from their partners’ perspective, 56%
- Less involved with partner at home: From the sufferers’ perspective, 60% affected; from their partners’ perspective, 20%
- Spend less time with partner: From the sufferers’ perspective, 56% affected; from their partners’ perspective, 35%
- More likely to argue: From the sufferers’ perspective, 50% affected; from their partners’ perspective, 29%
- Be a better partner without headaches: From the sufferers’ perspective, 47% affected; from their partners’ perspective, 36%

Source: Lipton et al. Cephalalgia 2003;23:429-440
The Economic Burden of Migraine - Migraine is Costly to Society

**Annual Cost in the US**

$14.5 Billion Annually (1998)

- **Missed Work**: $7.9B (30%)
- **Direct Medical Cost**: $1.2B (10%)
- **Reduced Productivity**: $5.4B (60%)

Epidemiology Lesson 5: There Are Several Barriers Preventing Good Outcomes in Migraine Treatment
Barriers to Successful Outcomes

Motivate Patients to Seek Care

Consulting

NO

Migraine Patients in Need of Care

NO

Improve Diagnosis

Diagnosed

YES

Improve Treatment

Appropriately Treated

YES

Encourage Follow-Up

Ongoing Assessment of Control

NO

Good Outcome

NO

Although Progresses Were Made, a Significant Proportion of Migraineurs are Unaware of Their Diagnosis

<table>
<thead>
<tr>
<th></th>
<th>AMS-I</th>
<th>AMS-II</th>
<th>AMPP</th>
<th>Change of 15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migraine Diagnosis</td>
<td>38%</td>
<td>48%</td>
<td>56.20%</td>
<td>47.9%</td>
</tr>
<tr>
<td>Sinus Diagnosis</td>
<td>43.10%</td>
<td>42%</td>
<td>39%</td>
<td>-9.5%</td>
</tr>
<tr>
<td>Tension Headache</td>
<td>44%</td>
<td>32.30%</td>
<td>31%</td>
<td>-29.5%</td>
</tr>
<tr>
<td>&quot;Sick&quot; headaches</td>
<td>13.10%</td>
<td>7.80%</td>
<td>7.50%</td>
<td>-42.7%</td>
</tr>
<tr>
<td>Cluster headache</td>
<td>17.90%</td>
<td>6.50%</td>
<td>9.90%</td>
<td>-44.7%</td>
</tr>
</tbody>
</table>

Most People With Migraine Still Use OTC Medications

6 in 10 Sufferers Still Rely on OTCs Alone or No Medication to Manage Headache Pain

Epidemiology Lesson 6: Comorbidities are Frequent in Migraine and Complicate Diagnosis and Treatment
Migraine is Comorbid With:

- **Neurologic disorders**
  - Epilepsy
  - Ischemic stroke
  - Tourette’s

- **Psychiatric disorders**
  - Depression
  - Bipolar disease
  - Anxiety/panic disorder

- **Other disorders**
  - Raynaud’s
  - Snoring/sleep apnea
  - Asthma/allergy
  - Noncephalic pain
  - GI disorders
  - Arthritis
  - Low back pain
Comorbidities Increase With Increased Headache Frequency

* ORs and 95% confidence intervals adjusted for age, gender and SES (income)
Epidemiology Lesson 7

Although the Prognosis of Migraine is Variable, in a Subgroup Migraine Progresses Into Chronic Migraine
Migraine

Remission
- Evolution to symptom free over prolonged period of time

Persistence
- Relative clinical stability and no markers of progression

Progression
- Clinical
  - Evolution to chronic migraine
- Functional
  - Changes in the PAG
- Anatomical
  - Lesions in the brain
  - Lesions outside the brain

**Evidence from Epidemiology**

**Baseline**
- 798 Migraineurs

**1-year follow-up**
- 23 (3%) New-onset CDH (180+ headache days/year)
- 49 (6%) Intermediate (105 to 179 headache days/year)
- 726 (91%) Stable controls (2 to 104 headache days/year)

## Risk Factors for Migraine Progression

<table>
<thead>
<tr>
<th>Not modifiable by health interventions</th>
<th>Modifiable by health interventions</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Sex</td>
<td>Attack Frequency</td>
<td>Allodynia</td>
</tr>
<tr>
<td>Low Socioeconomic Status</td>
<td>Obesity</td>
<td>Other pain syndromes</td>
</tr>
<tr>
<td>Head Trauma</td>
<td>Medication Overuse</td>
<td>Pro-Inflammatory Status</td>
</tr>
<tr>
<td></td>
<td>Caffeine Overuse</td>
<td>Pro-Thrombotic Status</td>
</tr>
<tr>
<td></td>
<td>Stressful life events</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Snoring</td>
<td></td>
</tr>
</tbody>
</table>

Bigal and Lipton, Headache 2006
Probability of Chronic Migraine as a Function of Barbiturate Exposure

Probability of Chronic Migraine as a Function of Opioid Exposure

Summary

- Migraine is a frequent and disabling chronic disease with recurrent attacks
- Migraine is common in men and 3 times more common in women
- The burden of migraine is higher in the years of peak productivity
- The burden of migraine affects the individual, family and society
Summary

- Despite improvements, several barriers to good migraine outcomes still exist.
- Several disorders are comorbid to migraine. They complicate diagnosis and treatment.
- In a subgroup, migraine progresses. Risk factors for progression have been identified and should be screened and treated.