Stemming the tide of osteoporosis epidemic

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I long to accomplish a great and noble task,
But my chief duty is to accomplish small tasks as if they were great and noble.

Helen Keller.
OBJECTIVES

• The concept
• Epidemiology
  – Global
  – Kenya
  – Africa
• Life style risk factors
• Consequences

• What can be done?
  – Prevention strategies
• Treatment aims
• Non pharmacological mgt
• Pharmacological approach
• Strategies for control
• Parting shot
Osteoporosis

- Fragile bones due to low calcium leading to fractures

- Common in women over 50 years

- Risk of dying following a hip fracture equals the risk of dying from breast cancer (20%)
An underestimated disease?

- Affects 150 million people worldwide
- 1 in 3 and 1 in 8 men >50 years
- \( \frac{1}{2} \) women, 1 in 6 men >50 years will have osteoporosis related fracture
- Vertebral fracture – pass off as inevitable consequence of aging
- Only 1/3 receive medical attention
Is there osteoporosis in Kenya?

KNH study (Odawa et al):

• postmenopausal women:
  – 24.3% have osteoporosis
  – 32% have osteopenia

• Premenopausal Women:
  – 0.9% have osteoporosis
  – 20.5% have osteopenia
Is there osteoporosis in Kenya?

AKUH Study (Odula et al):

- **Number of patients**
  - African
  - Asian
  - Caucasian

- **Race**
  - Osteoporosis/penia
  - Normal
Is there osteoporosis in Kenya?

**Odawa et al**
- Osteoporosis; 24.3% in PMW, 0.9% in preMW.
- Osteopenia; 32% in PMW, 20.5% in preMW.

**Odula et al**
- Caucasians > Asians > Africans.

Osteoporosis in Africa?

- Paucity of data
- Osteoporosis and fragility Fractures of hip and distal fore arm common- but rates lower than UK (Adebajo et al; Zebaze et al)
Osteoporosis in Africa?

- Ethnic differences well-described
- Blacks have fewer fractures
- Blacks have higher BMD
- Are these differences due to BMD or bone strength?
The burden is increasing across the globe

Why?

• Ageing of the population
  – People are living longer in all populations

• Changes in lifestyle
Choices have consequences?
Lifestyle Risk Factors

Diet
- Calcium
- Vitamin D
- Nutrition (young & elderly)

Alcohol & Smoking
- greatest increases in developing countries
Consequences

• Decreased quality of life
• Dependency on others
• High mortality( 60% following vertebral fracture, six fold following hip fracture)
• Increased hospitalization rates
The most common sites of fractures are, wrist, spine and hip.

CONSEQUENCE – FRACTURES!

- Wrist - Colles
- Vertebral
- Femoral Neck
The “silent disease”

- Often called the “silent disease”
- Bone loss occurs without symptoms
  - First sign may be a fracture due to weakened bones
  - A sudden strain or bump can break a bone
Consequences : Lifetime risk %

• Hip fracture
  – Males 3
  – Females 14

• Spine fracture
  – Males 6
  – Females 28

• Wrist fracture
  – Males 2
  – Females 13

From Melton LJ, Atkinson EJ, O’Fallon WM, Wahner HW, Riggs BL.
Consequences of Hip fracture

• Functional impairment
• Limited ability to walk
• Limited ability to perform daily activities
• 50 % never walk again un-assisted
What can be done to prevent and control osteoporosis?
Risk factors for osteoporotic fractures.

<table>
<thead>
<tr>
<th>Non-modifiable risk factors</th>
<th>Modifiable risk factors</th>
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<tbody>
<tr>
<td>Advanced age</td>
<td>Current smoking</td>
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<tr>
<td>Personal history of fracture as an adult</td>
<td>Low body weight</td>
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<tr>
<td>History of fracture in first-degree relative</td>
<td>Oestrogen deficiency</td>
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<tr>
<td>Caucasian race</td>
<td>Low lifelong calcium/vitamin D intake</td>
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<tr>
<td>Female sex</td>
<td>Alcoholism</td>
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<tr>
<td>Dementia</td>
<td>Impaired vision</td>
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<tr>
<td>Poor general health (non-preventable)</td>
<td>Recurrent falls</td>
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<td>Inadequate physical activity</td>
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<td></td>
<td>Poor general health (preventable)</td>
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</table>
Preventive Strategies: *deal with risk factors*

– Physical activity
– Ideal body weight
– Balanced diet including calcium & vitamin D
– Avoid smoking & alcohol consumption
– Injury prevention
– A safe environment
A Bone & Joint Healthy Lifestyle
Treatment aims

– Pain control
– Restoring function
– Disease management

Interventions

– Lifestyle: diet, physical activity
– Medications as prescribed
– Surgery: fracture, joint replacement
– Rehabilitation: multidisciplinary
  • education & self-help
  • physical therapies
  • aids & appliances
Non-Pharmacological Prevention and treatment

- Adequate calcium intake
  - 1000mg/day premenopausal
  - 1500mg/day postmenopausal
- Adequate vitamin D intake (400-800 units/day)
- Exercise
- Smoking cessation
- Limitation of alcohol consumption (less than two drinks per day)
- Limitation of caffeine consumption to less than 2 servings per day
- Fall prevention
Effective pharmacological approaches

Bone Resorption inhibiting agents:
- Estrogen
- Bisphosphonates
  - Etidronate
  - Alendronate
  - Residronate
  - Ibandronate
  - Zoledronic acid
  - Pamidronate
- Raloxifene
- Calcitonin
- Tibolone

Bone Formation stimulating agents:
- Fluoride
- Androgens
- Growth hormone
- Parathyroid hormone
  - Teriparatide

Dual acting
- Strontium renilate

Newer Agents
- Denosumab
- etc
CALCIUM AND Vit D

Calcium plus Vitamin D Supplementation and the Risk of Fractures

CONCLUSIONS
Among healthy postmenopausal women, calcium with vitamin D supplementation resulted in a small but significant improvement in hip bone density, did not significantly reduce hip fracture, and increased the risk of kidney stones. (ClinicalTrials.gov number, NCT00000611.)
HRT/ERT

• HRT increases BMD in PMW.
• Consistently beneficial effect on BMD at all sites.
• Reported to ↓ RR of # of spine by up to 50%, nonvertebral # hy ~ 30%
• Used to be a 1st line therapy in prevention of PMO till WHI results.

HRT/ERT

• Women’s Health Initiative (WHI)\(^{1-2}\)
  – 2 parallel trials- HRT & ERT. #s a secondary outcome.
  – 1\(^{st}\) trials with definitive data supporting ability HRT/ERT to prevent overall #s of the hip, vertebrae and other sites, in a pop of PMW not selected for osteoporosis based on BMD.

HRT/ERT- WHI

Study stopped prematurely

- HRT arm- 5.2 yrs(8) due to increased risk of Ca Breast (↑ of 8/10,000 person years).
- ERT arm- 6.8yrs- due to increased risk of Stroke (8/10,000p yr).

Recommendation:

- Risks incurred made long term use of HRT for bone protection unacceptable.
Indications

• Treatment of mod to severe symptoms of menopause.
• Prevention of osteoporosis in early(< 10yr) PMW with low bone density.
• Not for Rx of osteoporosis.

• FDA news Jan 2003.
• Society of Obstetric and Gyns of Canada (SOGC) consensus conference on osteoporosis, 2006 Update.
Bisphosphonates---

Indications

- 1\textsuperscript{st} line Rx for PMO (superior to estrogen). Alendronate, Risedronate, Ibandronate. Etidronate (UK, not FDA).
- Prevention of PMO (Estrogen is superior).
- Drugs of choice for Rx & prevention of glucocorticoid-induced osteoporosis (GIOP)- Alendronate, Risedronate.
- Rx of osteoporosis in men- Alendronate. Others (Etid)
- Prevention of bone loss after organ transplant- IV Pamidronate & Zoledronate may do this.

Combination therapy

Antiresorptives

- May be synergistic in ↑ BMD.
- Antifracture effectiveness unproven.
- Not recommended.

PTH + Antiresorptives

- Bisphos given concurrently or preceding PTH- may slightly blunt effect of PTH. Estrogen and Raloxifene does not.
- Bisphos given after a course of PTH- enhances and maintains the bone mass (good evidence).
- Since fracture data lacking, combination therapies not usually recommended.
Combination therapy---

When HRT is used for symptomatic Rx of PMW, addition of Biospho or PTH is indicated in:

- Significant bone loss despite HT.
- Glucorticoid therapy (≥ 7.5mg prednisone/d, for ≥ 3/12).
- Osteoporotic # in a woman on HT.

- Society of Obstetric and Gyns of Canada (SOGC) consensus conference on osteoporosis, 2006 Update.
Fracture Reduction %

- Calcitonin 36 % (PROOF)
- Raloxifene 30% (MORE)
- Alendronate 46 % (FIT I and FIT II)
- Residronate 47 % ( VERT –NA; VERT-MN)
- Ibandronate 60%
Strategies to Control Osteoporosis

- Identify those who are at highest risk
- Early and appropriate management
- Access to appropriate care
- Fracture prevention strategies for those at highest risk
Recommended Protocol for Prevention and Treatment

1. Know and understand risk factors.
2. Recommend adequate dietary calcium supplement and exercise.
3. Identify at-risk persons — regardless of age or sex.
4. Obtain bone density measurement in at-risk persons. Follow up affected persons with appropriate therapy.

(cont’d)
5. Initiate estrogen replacement in hypoestrogenic or menopausal women.

6. Initiate biphosphonate therapy in patients with established osteoporosis who cannot take estrogen.

7. Continue bisphosphonate therapy for at least 3 years.

8. Monitor bone density with quantitative studies every 2 years or more frequently if medically necessary.
Preventing osteoporosis

- Calcium
- Vitamin D
- Exercise
- Prevent falls
- Maintain weight
- Stop smoking
Conclusion

• Osteoporosis is a global problem affecting millions of people worldwide

• Effective treatments needed to:
  – Improve patients’ lives
  – Reduce escalating costs
"Joint diseases, back pain, osteoporosis and limb trauma due to accidents and armed conflict have an enormous impact on the individual, on society and on health care and social systems. With the increasing number of older people and changes in lifestyle occuring throughout the world, this trend will increase dramatically over the next decade and beyond. ...we must act on them now"

Kofi Annan
There are two primary choices in life, to accept conditions as they exist, or to accept the responsibility for changing them.

Denis Waitley
Shukran

- 감사합니다 (Korean)
- 感謝 (Chinese)
- Thank you (English)
- ありがとうございます (Japanese)
- Asante (Kiswahili)
- Gracias (Spanish)
- Merci (French)