

# Aetiology and prevention of osteoporosis geriartric health essay

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INTRODUCTIONThe human skeleton is composed of bones that are alive and are continuously growing (they are not dormant or static). Bones are continually modified throughout life, with some bone cells and tissues dying out and new bone cells created in a process called remodeling. With this lifelong turnover of bone cells, you replace most of your skeleton every 10 years. The main causes of osteoporosis in women is mainly due to low estrogen levels whilst in males low testosterone levels but in addition other causes may include low calcium, lack of vitamin D, certain medications(corticosteroids), thyroid conditions and so on. However, people with osteoporosis (a thinning of the bones) bone loss is more dominant than growth of new bone. Bone structure becomes porous, brittle, and susceptible to fracture (Dumitrescu et al. 2008.)Consensus Development Conference 1993 defined the term osteoporosis as a systemic disorder characterized by low bone mass and micro architectural deterioration (loss of bone tissue) in bone tissue which results in increased bone fragility or weakness and susceptibility to fractures. People with osteoporosis thus have increased risk for fracture bones especially in the hip, spine and wrist. According to World Health Organization 1994 defined the disease according to empirical terms as a bone mass less than 2.5 standard deviations from the mean value of bone in young adult women. This type of classification has been accepted globally as the measuring parameter in diagnosing osteoporosis. This is can be measured by the hand radiographs or osteodensitometry. Bone mineral density is currently also used to diagnose and monitor osteoporosis by using the technique called dual-energy X-ray absorptiometry (DXA) (O’neill 2005.). It has always been considered that osteoporosis is a medical condition that

usual causes weakness in elderly women. On the contrary, the impairment as a result of osteoporosis commences much earlier than previously believed. Most people attain maximum or peak bone density at approximately the age of 25 years and as such it is very essential to build strong and healthy body bones by that age. This will give the bones a better foundation to remain stronger and have enough bone tissue in later life or old age. Adequate intake of calcium is an important component of building stronger and healthy bones (O'Neill 2005.). Generally, osteoporosis has been grouped into primary and secondary osteoporosis. Primary osteoporosis includes osteoporotic conditions which are unrelated to other chronic illnesses and is normally associated with aging and decreased gonadal function, such as decreased level of estrogen, whereas secondary osteoporosis is the type of osteoporosis caused by other health problems. Disuse (inactivity of the bone) is one of the many reasons inducing bone loss and resulting in secondary osteoporosis (Howard 2011.). Disuse osteoporosis has been evident in regional phenomenon in the areas with significant reduction in weight bearing like lower limbs. Bones of lower limbs are subjected to mechanical stimulations during daily activities provided by static gravity-related weight-bearing, ground reaction forces, and dynamic loading generated by muscle contractions during locomotion. Physical exercise is essential for increasing or maintaining bone mass and strength (Rutherford 1990.).

## 2 RISK FACTORS FOR OSTEOPOROSIS

There are several risk factors associated with osteoporosis but however, they are categorized into two main types of risk factors. They are modifiable or potential modifiable and non-modifiable risk factors.

### 2.1 NON-MODIFIABLE RISK

FACTORS These risk factors cannot be altered or changed by human or external factors but they happen to be part of the normal life processes.

1. AGE The risk for developing osteoporosis increases with ageing. Aging causes bones to thin and weaken. The reason behind is the gradual reduction of bone mass density after the peak age of 25-30 years, and as a result the risk of osteoporosis increases. Bone loss is a natural part of aging, osteoporosis however is not. A significant increase in prevalence with each decade after age 60 has been demonstrated. A survey by the United States National Health and Nutrition Survey (NHANES) showed that postmenopausal women revealed the prevalence of osteoporosis in Caucasian American women was 27% between 50 to 59 years, 32% between 60 to 69 years and 41% of women older than 70 years (Snelling et al. 2001). It can be deduced from the survey that as age increases, the population of women with osteoporosis also increases significantly.
2. 1. 2 SEX Women are at higher risk of developing osteoporosis due to smaller bones and as such lower total bone mass. Moreover, women lose bone tissues more continuously and rapidly after menopause and also women tend to live longer than men. Osteoporosis is less common in men but still remains a significant health problem in men as well. The rate at which bone tissue decay or is lost in men is much lesser compared to that in women. A research by Hannan et al. 2000, analyzed percent bone loss in women and men and it revealed that the percent for women ranged from 0.86% to 1.21% (different body bone measurement). whilst males were much lesser, ranging from 0.04% to 0.90%. Men are predominantly affected by secondary causes of osteoporosis (Hannan et al. 2000.).
2. 1. 3 ETHNICITY Adults and the aged from all different

ethnic groups are susceptible to developing osteoporosis but some have greater risk of developing it than others. Caucasians and Asian men and women have comparatively higher risk of developing osteoporosis in their old age. In addition, Caucasian women have two times greater risk of developing hip fractures compared to African- American women (Snelling et al. 2001.). Afro-Caribbean women tend to have higher bone density compared to Caucasian women at all ages to a higher peak bone mass and also slower bone deterioration or loss. Caucasian women have a 2.5fold greater risk of developing osteoporosis later in life (Aloia et al. 1996; Snelling et al. 2001.).

#### 2. 1. 4 REPRODUCTIVE RISK FACTORS

Reproductive health affects the risk of developing osteoporosis later in person's life. The main causing factor is the reproductive hormonal imbalance associated with changes in person's life especially changes associated with period of menopause. There is significant evidence that links low bone mass density to early menopause (Melton et al. 1993.). As a result, women with an early and long period of menopause needs to be considered at a higher risk of developing osteoporosis than others of same age group but experience menopause at a later period. Bone mass density reduces significantly in the early postmenopausal period (Ravin et al. 1999). A study by Hannan, 2001 proved that hormonal therapy specifically estrogen replacement therapy is associated with higher bone mass density. As such women under estrogen therapy are considered to be at lower risk of developing osteoporosis as women in similar situation which are not using the therapy (controlled group). Certain hormones such as too much thyroid hormone (hyperparathyroidism) can cause excessive bone loss. This occur when the

thyroid gland is overactive or overmedication with thyroid hormone to treat an underactive thyroid. 2. 1. 5 FAMILY HISTORY OF OSTEOPOROSIS

Bone health is strongly inherited from one family generation to the next generation. One of the most important risk factor for osteoporosis is genetic heredity. Family history of osteoporosis can provide essential evidence to whether one has higher risk of developing osteoporosis. Persons with family history of any signs of osteoporosis (fractured hip after minor fall or rapidly lost height) or been diagnosed with osteoporosis have greater chance of developing osteoporosis. A family history includes past history of osteoporosis or brittle bones, kyphosis, or low trauma fracture after age 50 years. Lower bone mass density is commonly associated with women and men with a family history of osteoporosis (Omland et al. 2000.). 2. 2

MODIFIABLE RISK FACTORSThis implies that these various risk factors can be altered or change in reducing the likelihood of developing osteoporosis. 2. 2.

1 WEIGHTWeight loss or low body mass index (BMI) signals lower bone mass density (Omland et al. 2001.). Moreover, women in the lowest tertile of body mass index have two-fold greater risk than those in highest tertile. Women in post- menopausal period with body mass index below the average are at higher risk of osteoporosis (Ravin et al. 1999.). 2. 2. 2 SMOKINGSmokers should be considered at greater risk of osteoporosis than non-smokers, and advised to stop, for this and other reasons. A meta-analysis of several studies investigated the effect of smoking on bone mass density revealed that bone mass density of smokers was 2% lower with each increasing decade (10years interval) after the menopause than in non-smokers. At the age of 80years, the difference in bone mass density was about 6% (Law &

Hackshaw 1997.). Female smokers have been shown to be at greater risk of hip fracture than non-smokers, with the risk increasing in line with cigarette consumption. The level of risk declines on giving up smoking, but is not significantly reduced until 10 years after cessation (Cormuz et al. 1999.). 2.

2. 3 ALCOHOLEvidence for alcohol as a risk factor for low body mass index is inconsistent, as the majority of studies do not include subjects with

excessive alcohol intake. 2. 2. 4 EXERCISEBones deteriorate faster when they are not worked out. For instance, constant weightless in astronaut have

been found to cause osteoporosis. People with paralysis or muscular dystrophy for instance have higher risk of developing osteoporosis as bone loss increases rapidly and decreases the bone mass. Regular exercise can

reduce the likelihood of bone fractures associated with osteoporosis. 2. 2. 5

DIETHHealthy eating helps to manage osteoporosis. Calcium and other essential bone health foods are very important in the prevention of

osteoporosis. Excessive salt intake appears to increase loss of calcium through excretion and this can affect the overall bone health of a person's

bone health. Vegetables and fruit are very rich with elements and nutrient

that can help nourish and help build healthy new bone cells. Fatty foods

need to be avoided as it interferes with the bone health. 3 NURSING

MANAGEMENT AND PREVENTION OF OSTEOPOROSISNurses play an

important role in facilitating the detection of osteoporosis, their involvement in the assessment of patients at various points of contact within the health

care system. Incorporating simple questions into standard patient

assessments or admission processes can facilitate the earlier detection of

potential osteoporosis, by including, for example, a history of height loss or a

fragility fracture (a broken bone that occurs as a result of minimal trauma, such as a fall from a standing height or less), and other common risk factors for the development of osteoporosis. Nurses have greater opportunity in identifying patients at risk of fragility fracture. High-risk people can present anywhere in the nursing discipline. Nursing professionals are ideally placed to identify such patients and to report and take note of any risk factors such as corticosteroid use. Through education or health promotion, nurses carry the message of awareness of osteoporosis to the general public. They educate people to exercise more as it helps increase the bone mass and subsequently prevent osteoporosis. However, building strong bone health during childhood and during the adolescent stage is the best defense against developing osteoporosis in later life. Physical exercise has several advantages such as improving blood pressure and psychological well-being, and bone mineral density. Daily intake of Vitamin D and calcium help to improve better bone health. Nurses also educate and support smokers and people alcohol addicts in quitting as it can be a great risk factor in developing osteoporosis.