Table 1. Proposed pathophysiologic links between depression and bone deterioration

Poor lifestyle, tobacco and alcohol abuse, physical inactivity, dietary imbalances

Hormones

- **Gonadal hormones.** Suppression due to chronic stress
- **GH**. Suppression due to chronic stress
- **Cortisol**. Excessive secretion due to hyperactivity of the hypothalamicpituitary- adrenocortical axis
- **Leptin**. Not adequate data to support definite involvement.
- **Vitamin D** and **PTH.** Depression linked with hyperparathyroidism, and low vitamin D levels. No association of depression and PTH in majority of studies.

Sympathetic Nervous System. Inhibitor of bone mass accrual. Excessive activity in depression.

Serotonin

a. gut-derived: direct effect on bone, promoting reduction in osteoblast proliferation

b. brain-derived: indirect effect on bone, through decrease of the activity of the sympathetic nervous system. In depression, brain 5HT levels fall. SSRIs may increase the direct effect on osteoblasts.

Cytokines. Stimulated, by CRH, production of IL-6

GH: Growth hormone, PTH: Parathyroid hormone, 5HT: Serotonin, SSRI: Selective Serotonine reuptake inhibitor, CRH: Corticotropin releasing hormone, IL: interleukin