

**Original Research Article****TO DETERMINE THE CONCERN OF FEMALES OF KARACHI TOWARDS THEIR BONE HEALTH****Humera Khatoon\*, Sobia Javed, Sidra Jilani, Qurat-UI-Ain Shams**

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**ABSTRACT**

**Background:** Osteoporosis is a disease that thins and weakens the bones to the limit that they become fragile and break easily. It is usually thought that osteoporosis is an unavoidable part of aging but good lifestyle habits can help us protect our bones and decrease our chance of getting osteoporosis. Since women are at greater risk of developing osteoporosis than men because of multiple reasons, the study was conducted to assess prevalence of risk factors among studied groups which can help guide early intervention.

**Aim:** The aim of the study is to evaluate the concern of bone health among females of Karachi and to analyze their dietary habits. Through this research, our principal outcome was to specify the forces which ultimately leads to the disrupt bone matters, determination of outcomes regarding female health and reduce burden of risks among them.

**Method:** For this purpose a survey with questionnaire was scrutinized including a total sample size of 150, grouped into premenopausal and postmenopausal females. Interviews were conducted regarding their dietary pattern, drug history and Bone Mineral Density test (BMD) histories.

**Results:** The datashowed that 86% of the participants were not even aware of BMD test and its significance while only 14% of participants were aware of BMD test but none of them had it done in their whole life. Results also showed that frequency of taking calcium supplements, milk or other dairy products is very low among studied groups whereas soft drink, caffeinated products and chocolate are consumed as their routine diet.

**Conclusion:** It is concluded that the females of Karachi mostly are not concerned about their bone health and bone related issues.

**Keywords:** Osteoporosis, Dietary pattern, BMD test, Risk factors, postmenopausal.

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**INTRODUCTION**

Osteoporosis is a major public health problem. Its prevalence has been increasing with the aging of the world population[1]. Individual with osteoporosis have compromised bone strength due to reduced bone density, which predisposes them to an increased risk of fractures of the hip, spine, and other skeletal sites. Healthy balanced diet and good lifestyle habits can help protect our bones and decrease chance of getting osteoporosis[1].

Since women are at greater risk of developing osteoporosis than men because of hormonal factors, all postmenopausal women should be assessed routinely for signs of osteoporosis during physical examinations. In order to avoid risk of fracture, a Bone Mineral Density (BMD) test should be recommended to all women over the age of 65, younger postmenopausal women with risk factors, and all postmenopausal women with a history of fractures[1].

There are many other risk factors associated with osteoporotic fracture including the use of steroids (e.g. glucocorticoids), cigarette smoking, low calcium and vitamin D intake, race, small body size, and a personal or a family history of fracture[2].

According to the National Institute of Arthritis and Musculoskeletal and Skin Diseases, osteoporosis statistics show a greater burden for women in the following ways:

- 68 percent of the 44 million people at risk for osteoporosis are women.
- One of every two women over age 50 will likely have an osteoporosis-related fracture in their lifetime. That's twice the rate of fractures in men — one in four.
- 75 percent of all cases of hip osteoporosis affect women.

Our initiatives included the provision of beneficence of awareness, determination of outcomes regarding female health and reduce burden of risks among them

## METHODOLOGY

A questionnaire based study on dietary habits in females including consumption of milk, calcium, vitamin D supplements and exposures in their daily routine was conducted. A sample of 150 including, premenopausal and postmenopausal females was taken from different areas of Karachi. The individuals were selected on random basis. The analyzed females were divided into two groups as premenopausal and post-menopausal ranging in age 17-50 years and above, weighing less or more than 110 pounds (lb)/50 kilogram (kg).

- List of 17 questions including 3 sub-questions were asked on various exposures which were hypothesized to be causing a perspective result of osteopenia.
- The close ended questions included the weight, age and menstrual status.
- The open ended questions included drug history, medical history and dietary pattern.
- The questions also included bone health history, concerns, and awareness to BMD (Bone Mineral Density test).

The survey was done to evaluate what habitual pattern females of premenopausal and postmenopausal groups usually adopt in their daily cycle. They were asked about the medical and drug history in order to identify most of those factors which leads to bone disruption or risky bone health issues.

The individuals were investigated upon questions regarding bone history and mishaps which gives an idea to the background of developing osteopenia. They were questioned about the time spent in sunlight and concerns to their bone health. Moreover, findings about the awareness to BMD test and having their routinely test to evaluate their bone health were also made. The survey answering session took 8-12 minutes. After completion of survey filling, the subjects were thanked with a sort of appreciation in taking part in our survey.

## Ethical consideration

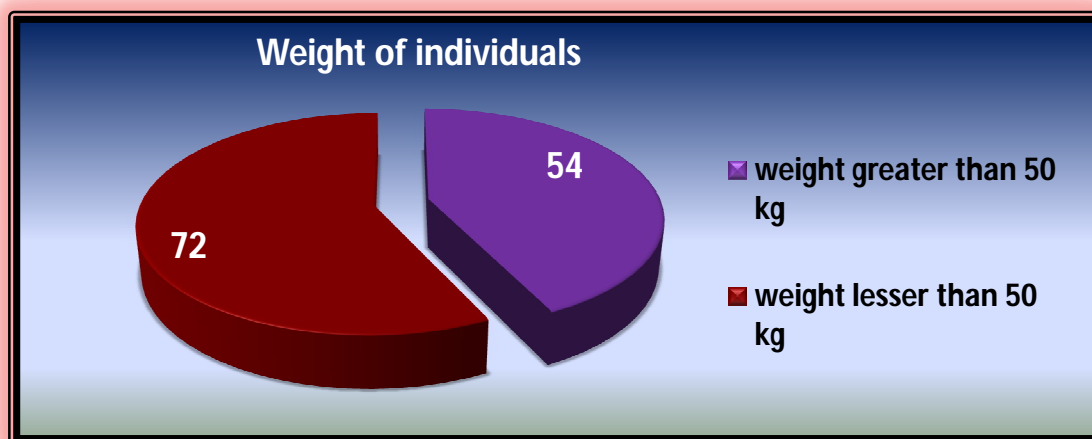
No harm was given to individuals who participated in the survey or to any member who were involved in conducting the survey. The data collected shall be privately confidential.

### Statistical analysis

The results are expressed in percentages through pie charts, doughnut chart and bar graphs to compare the weight, dietary history, medical history, menstrual status, drug history, bone health history, concerns and awareness to BMD (Bone Mineral Density test) among females of Karachi.

### RESULTS AND DISCUSSION

Figure.1-Body Weight range of Participants



During beneficial researches for osteoporosis prevalence in Asian women, a simple but most analytical tool preferred and suggested by researchers is by body weight and age[3].

In our study, female taken ranged in 54 were categorized in weighing greater than 50 kg, and 72 were categorized in lesser than 50 kg(Figure 1). The results showed that most of female under observation weighed less than average body weight and possess mostly less than 50 kg that can give an idea of their malnutrition or lack in bone development.

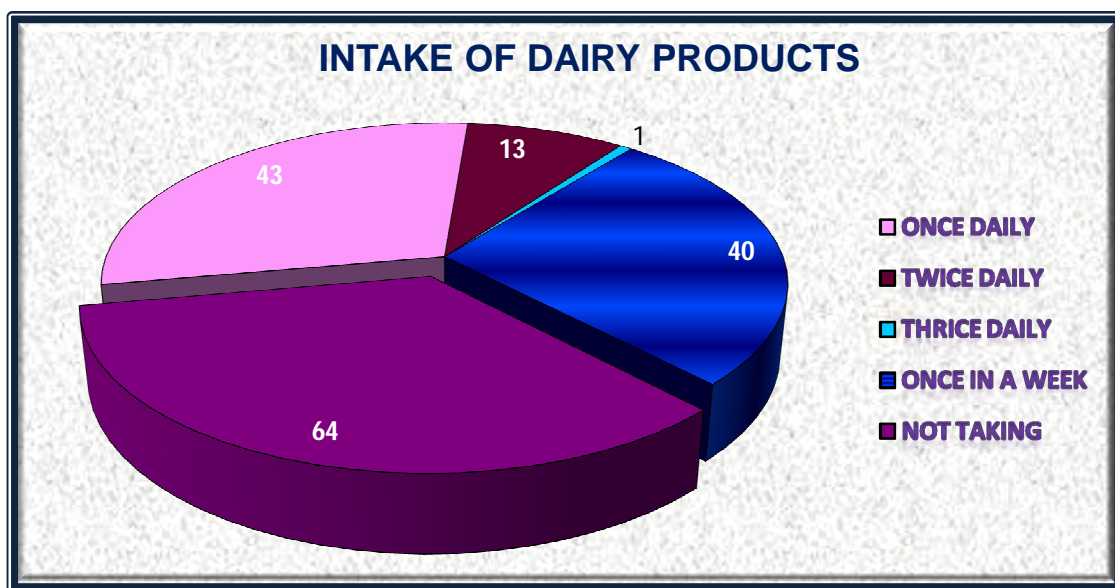
Calcium is necessary to many cell functions and serves as an essential element in the human body. Being a vital component of bone architecture, it is required for deposition of bone mineral throughout life. About 99% of the calcium in the body is found in bones and teeth, while the other 1% is found in the blood and soft tissue[4].

Table. 1-Recommended dietary intake of calcium and vitamin D

Age (years)	Calcium (mg/day)	Vitamin D (IU/day)
4-8	800	200
9-13	1300	200
14-18	1300	200
19-30	1000	200
31-50	1000	200
51-70	1200	400
≥70	1200	600

Source: Food and Nutrition Board, Institute of Medicine, National Academy of Science, 2010

An updated recommendation for calcium intake was released by the Food and Nutrition Board (FNB) of the Institute of Medicine in 2010 (Table 1). During childhood inadequate calcium can impair bone development and may prevent the attainment of optimal peak bone mass during early adulthood. In older adults inadequate calcium intake accelerates bone loss and likely contributes to the development of osteoporosis [5, 6]



**Figure.2a- Frequency of Taking Dairy Products**

Figure 2a shows that frequency of taking dairy products in individuals is low, which shows a low calcium intake from the dairy product in the diet in our study group.

Figure 2b shows usual frequency of milk consumption in individuals. Percentage of taking milk (daily, twice, thrice daily, once in a week) is less as compared to the females who do not take milk.

Figure 2c indicates that the trends of using calcium and vitamin D supplements in individuals are low when compared.

Vitamin D deficiency adversely affects bone health, recent research suggests that marginal vitamin D deficiency is common and increases the risk of osteoporosis. When vitamin D is metabolized to its most active form, it increases the intestinal absorption of calcium and prevents urinary calcium loss. Without sufficient vitamin D, calcium absorption is not efficient enough to satisfy the body's needs, even when calcium intake is adequate [7, 8].

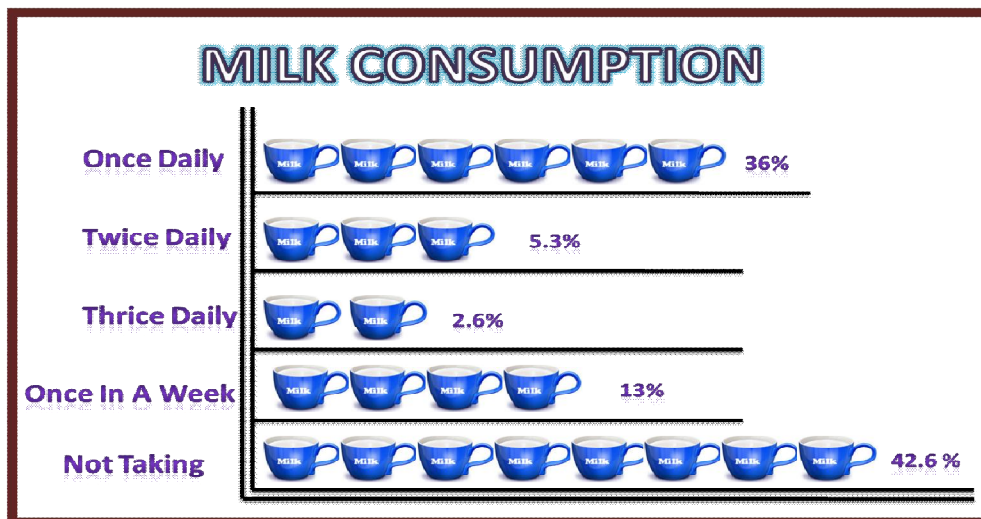


Figure.2b-. Frequency of milk consumption in individuals

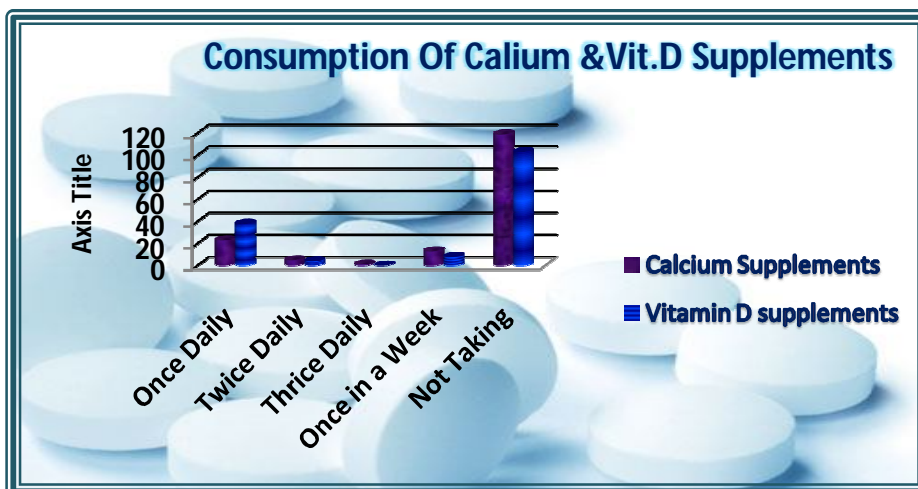


Figure.2c-Trends of Using Calcium And Vitamin D

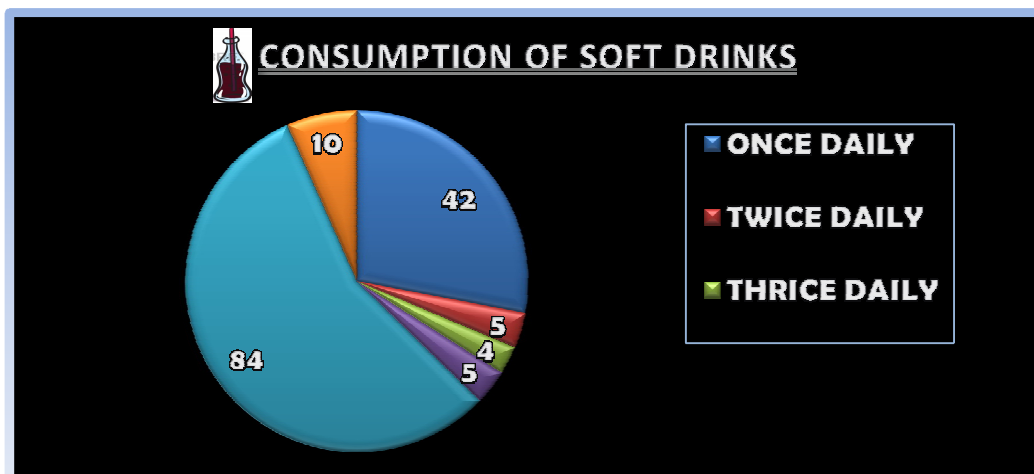
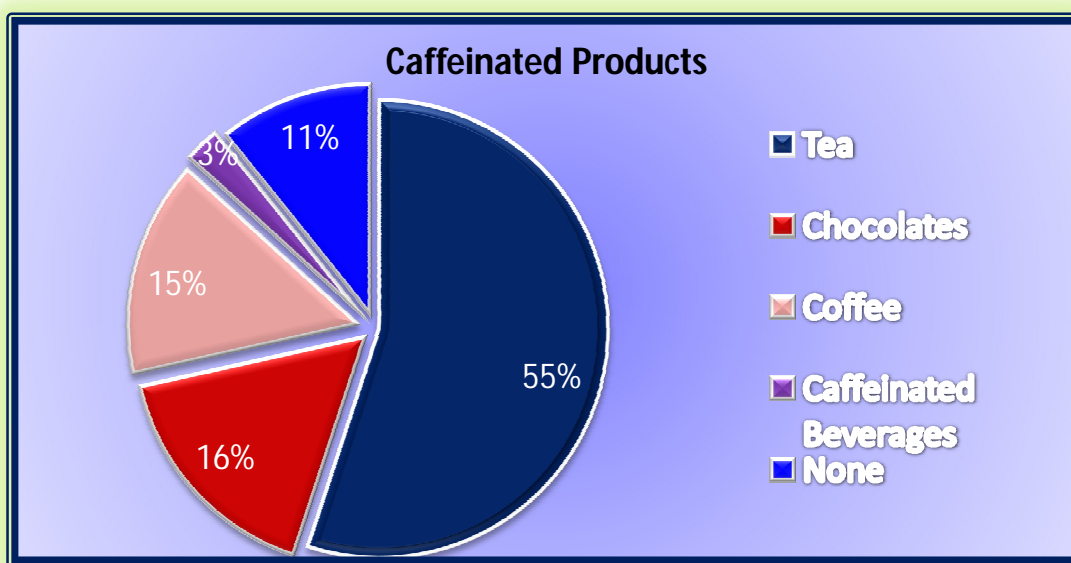


Figure.3- Trend of Consumption of Cold/Soft Drinks

It is a deliberate effect that most of people consume cold/soft drink thinking to improve the dietary dissolution of food and improving digestive abilities. Fact configures that cola drinks containing phosphorous in the form of phosphoric acid."The more cola that women drank, the lower their bone mineral density was!" says researchers. While various other studies have suggested that cola contributes to bone mineral density loss because it replaces milk in the diet. Women in the study who consumed higher amounts of cola did not have a lower intake of milk than women who consumed fewer types of cola[9].

As per our estimated results (Figure 3), almost 84 of the participants answered that they are having cola drinks once weekly in a diet, 42 participants answered that they have cola drinks once a day and only 10 participants were rarely taking such drinks. The result emphasized on the fact that dietary habits of females which usually consume cola drinks are unaware of the fact of bone health risks.

The prospective data suggests that caffeine and alcohol consumption both increase the risk of osteoporotic fractures in middle-aged women as caffeine interacts with vitamin D receptors[10]. Another study suggests, intake of caffeine in amounts >300 mg/d accelerate bone loss at the spine in elderly postmenopausal women and subsequently in young girls[11].

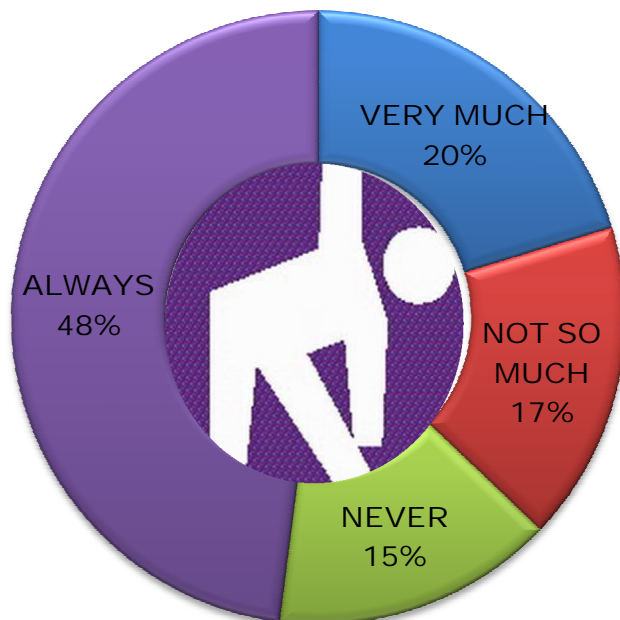


**Figure.4- Frequency of Taking Caffeinated Products**

Our estimated data in Figure 4 shows that, 55% of individuals normally take tea in daily routine, 16% take chocolates, 15% coffee, 3% caffeinated beverages (sting, red bull etc), and 11% do not take any caffeinated beverages in their diet.

There is increasing evidence that physical activity is related to the development of various conditions which also includes osteoporosis and bone related disorders[12].

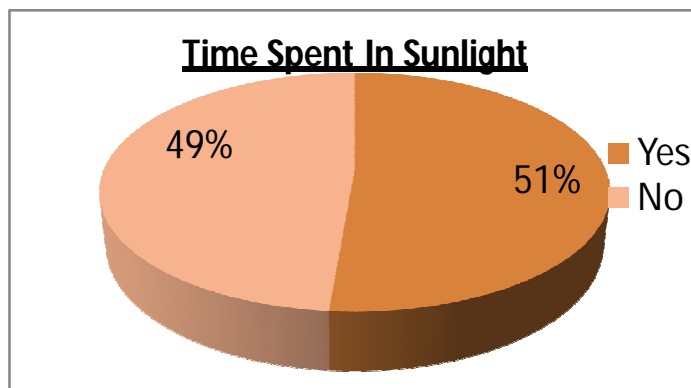
### PHYSICAL WORK



**Figure.5- Tendency of Having Physical Activities and Exercise in Daily Routine**

Figure 5, showing the data collected during the survey depicts that most of the females are usually involved in physical activities in their daily routine work. This concludes that most of females are involved in physical work which depletes the bone nutrients; this can only be balanced by exogenous nutrients in diet adoption for proper bone health.

Skin makes vitamin D from ultra violet (UVB) rays in sunlight. The body is able to store the vitamin D and use it later. Vitamin D is synthesized in the skin when exposed to ultraviolet-B (UVB) radiation from sunlight and can be obtained from the diet[13].



**Figure.6-Time Spent in Sunlight for 15 min**

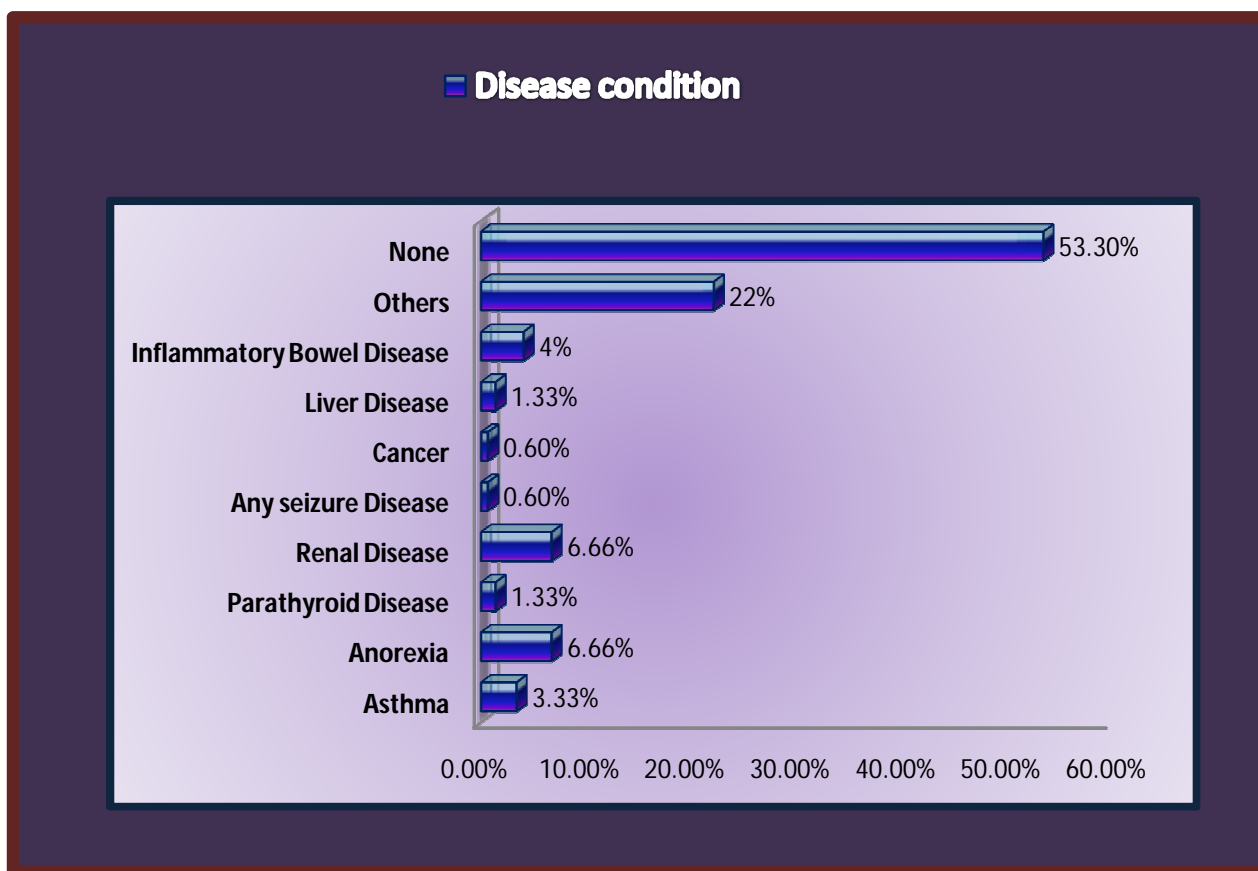
Figure 6 showed that 51% of women spend at least 15 minutes under exposure of sunlight and in 49% of women the result becomes negative. Most people require vitamin D from sunlight to absorb calcium by bones and make it strong against fracture. For this, one must spend at least 15 minutes under exposure of sunlight.

Liver disease is associated with reduced bone formation, vitamin D deficiency and low sex hormones, all of which may result in bone loss[14].

The parathyroid glands produce parathyroid hormone, which controls blood calcium levels. In primary hyperparathyroidism a tumour (generally benign) in one or more of these glands causes the production of more parathyroid hormone than is needed. This causes an increase in bone turnover, which results in excess calcium release from bone and a rise in the level of calcium in the blood. As a result, the risk of osteoporosis and fractures also increases[15]. This condition is more common in women after menopause.

Many patients with chronic kidney disease are treated with glucocorticoids such as prednisone, which puts them at risk for developing osteoporosis[16].

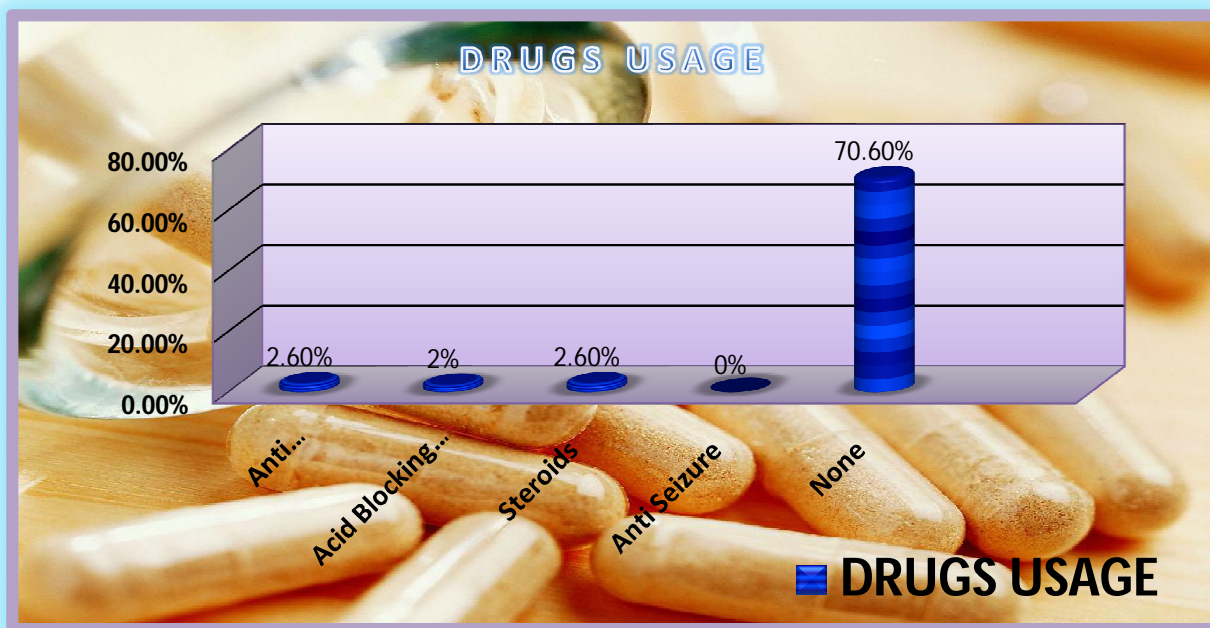
Chronic immune response and inflammatory process conditions, such as multiple sclerosis, lupus, emphysema, asthma, and rheumatoid arthritis, do not have a direct relationship to the development of osteoporosis. However, they frequently require the use of corticosteroid (sometimes in large doses) at varying points in the course of treatment, which results in secondary osteoporosis[17, 18].



**Figure.7- Disease Conditions in Individuals**

Figure 7 shows that, the 53% of people have none of the disease while 22% individuals suffering from any other diseases which are not specified here. Liver diseases,renal diseases,seizure,asthma, anorexia,parathyroid,cancer and inflammatory bowel diseases are the secondary cause of osteoporosis.

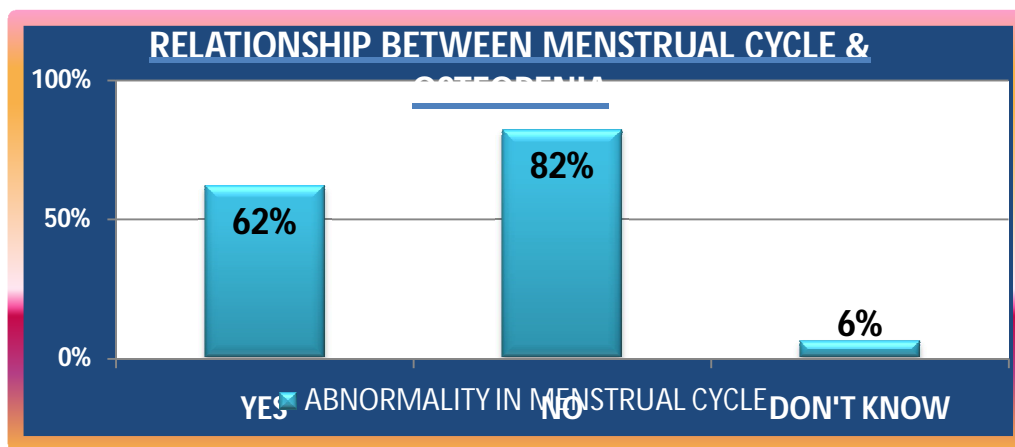




**Figure.8- Frequency of Drug Use**

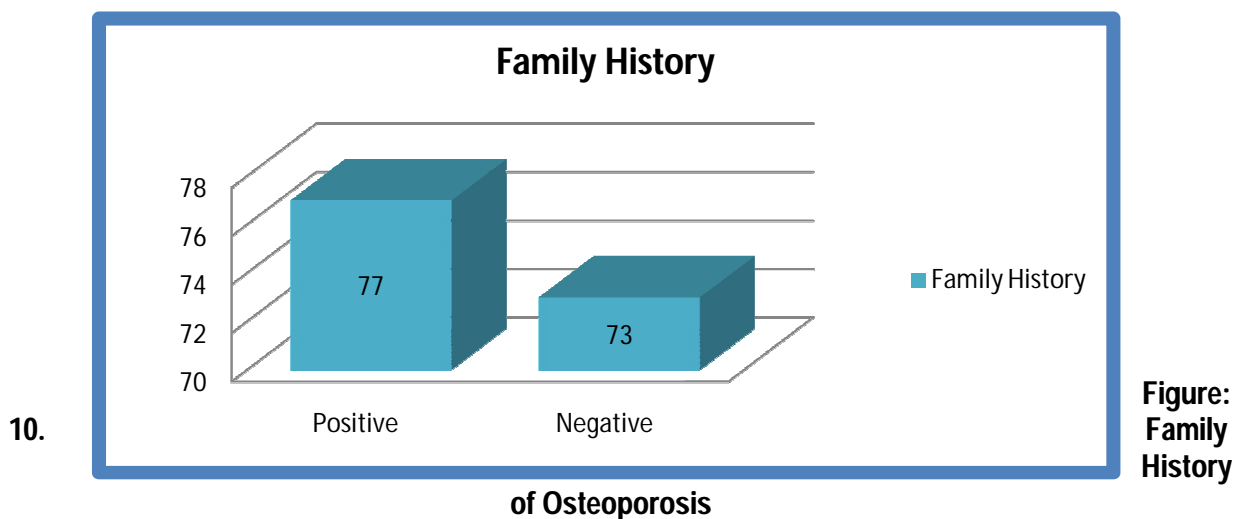
Osteoporosis is an exposure of taking different drugs including antidepressants, antacids, steroids, and anti-seizure drugs. According to our survey analysis the individuals under observation were not using any kind of such drugs(Figure 8).

About 3% of young women experience amenorrhea each year, moreover, adolescent girls often experience irregular menstrual cycles for a year or two after starting their periods. Menstrual irregularities are not usually taken seriously by women or doctors. Hence such disruptions could lead to bone loss and eventually osteoporosis, researchers have found. Researchers now believe that disruption of the ovaries' function at any age has a direct effect on bones. While many people think that bone loss occurs after menopause, when the ovaries have stopped working due to age[19, 20]. This usually happens due to disturbances in hormone production, long follicular phases are associated with reduced estrogen production during the early follicular phase, which are both associated with decreased bone mass[21].



**Figure.9- Relationship between Menstrual Cycle and Osteopenia**

Figure 9 shows, the survey conducted having question of abnormal menstrual cycle, was answered in 'Yes' by 62% females, and 82% females said 'No' and 6% of replied they don't know. The results show that many females are usually having abnormality in their menstrual cycles(Figure 9).



Family history is significantly and independently associated with osteoporosis[22]. From the estimated data, showed in Figure 10, in 31% of women positive family history was reported and in 69% of individuals family history was negative. Women with positive family history of osteoporosis have increased risk of having osteoporosis not only in them but also in their children, especially in daughters, nieces and granddaughters.

Electromagnetic field is one of the environmental factors which affect bone mineral metabolism [23]. Increased frequency of exposure to computers, television and mobile phones among young adults is affecting their bone health [24]. The damage to bone following irradiation is thought to involve damage to both osteoblasts and vascularity within bone [25].

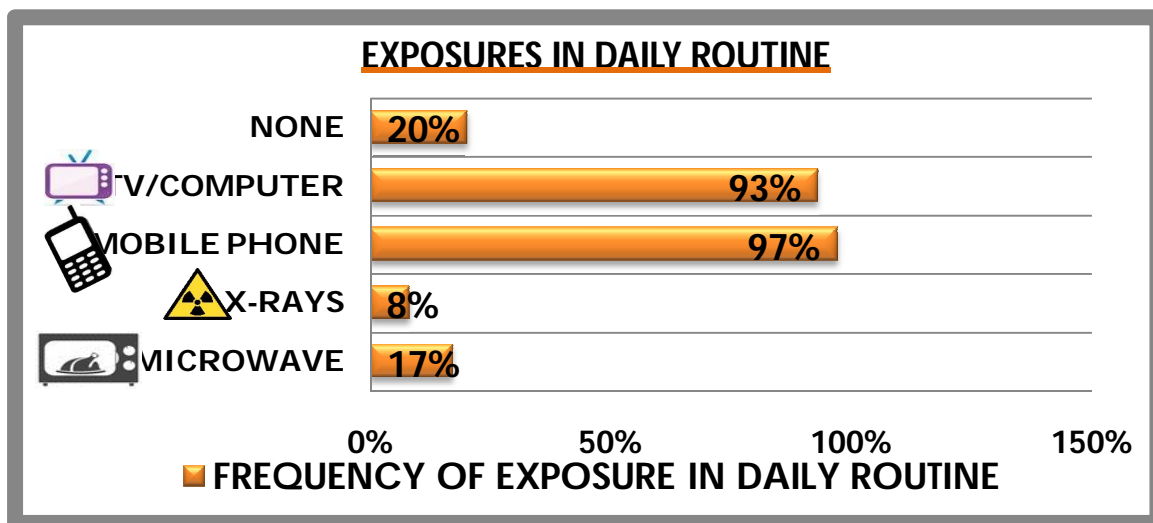
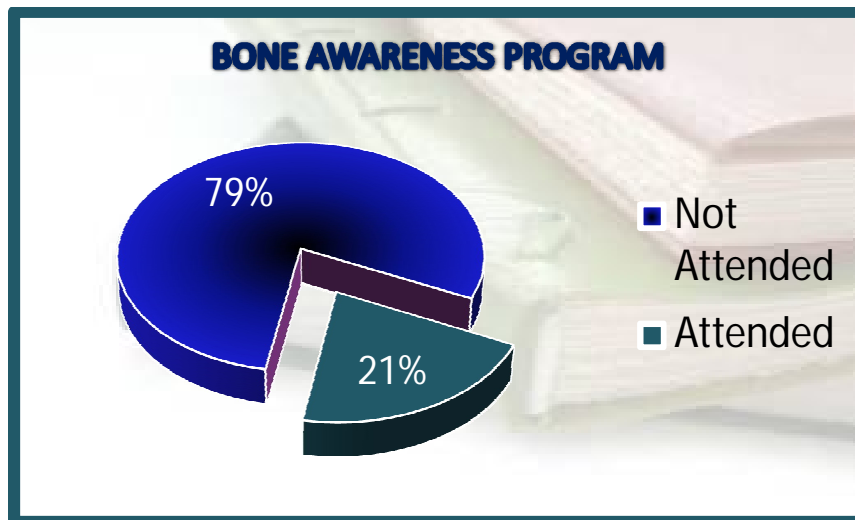


Figure: 11- Frequency of Exposure to Different Forms of Radiations

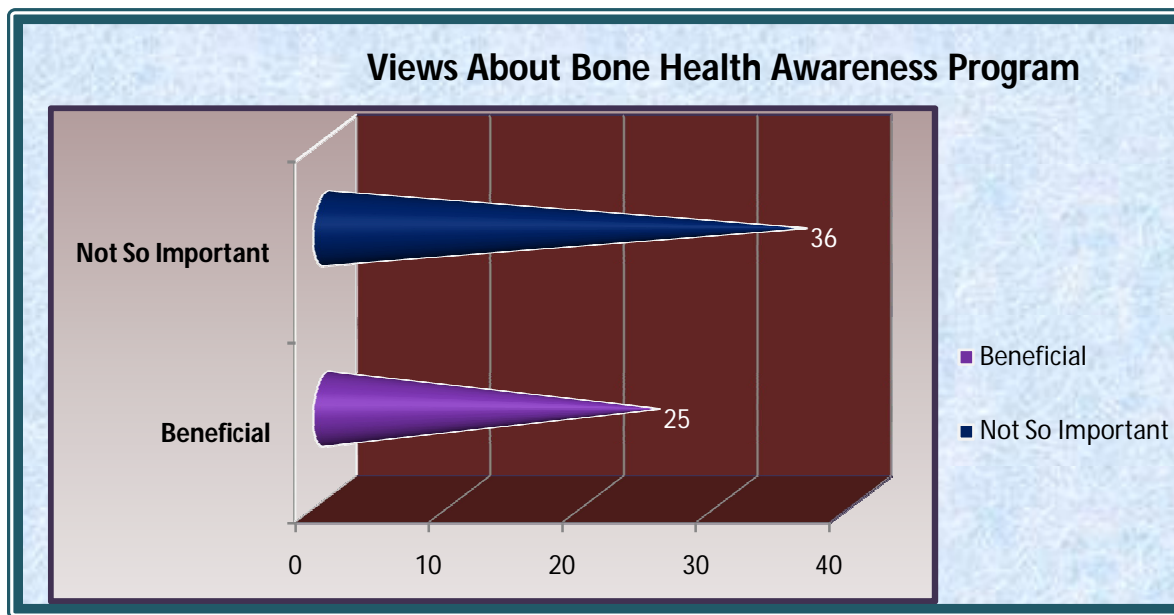
The Figure 11 showed the frequency of exposures to television/computer and mobile phone is extraordinary among teenagers, which may alternatively affect the bone and mental health[24].

Bone awareness program is an educational program aimed at improving the knowledge of teens and young adults about bone health and its disorders (such as osteoporosis and arthritis) and to encourage them to learn about effectiveness of prevention and treatment. Raising awareness of these conditions in young people may allow them to live healthier, happier lives and to combat one of the largest public health problems.



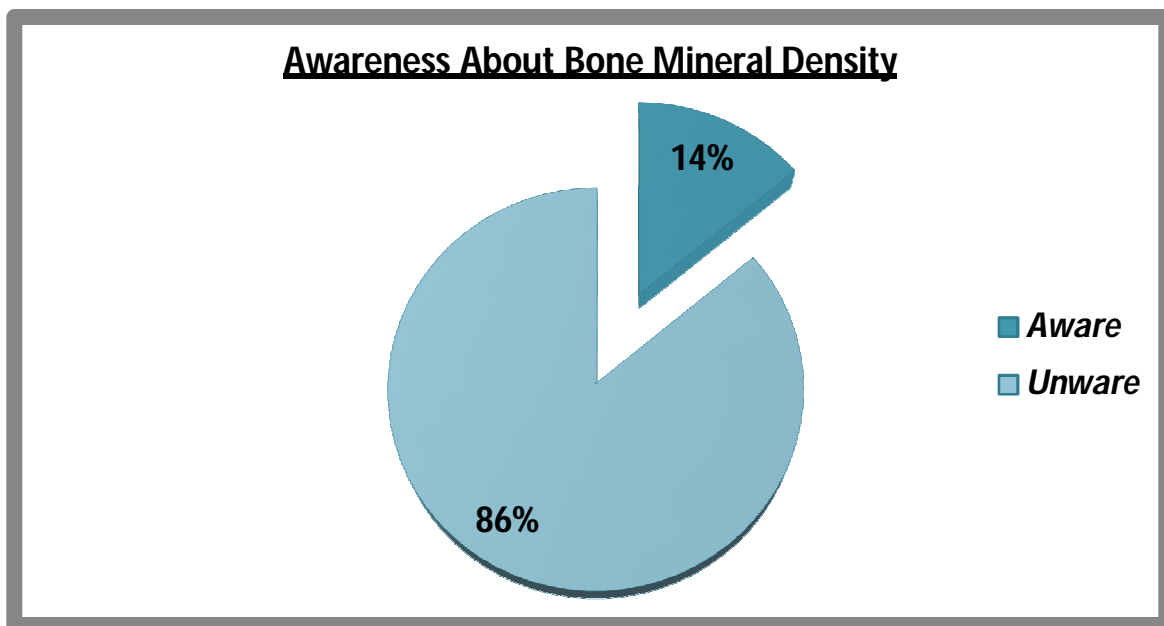
**Figure: 12. Bone Health Awareness Program**

Figure 12 shows that number of people attended the bone awareness programs are less in comparison with those who do not attended.



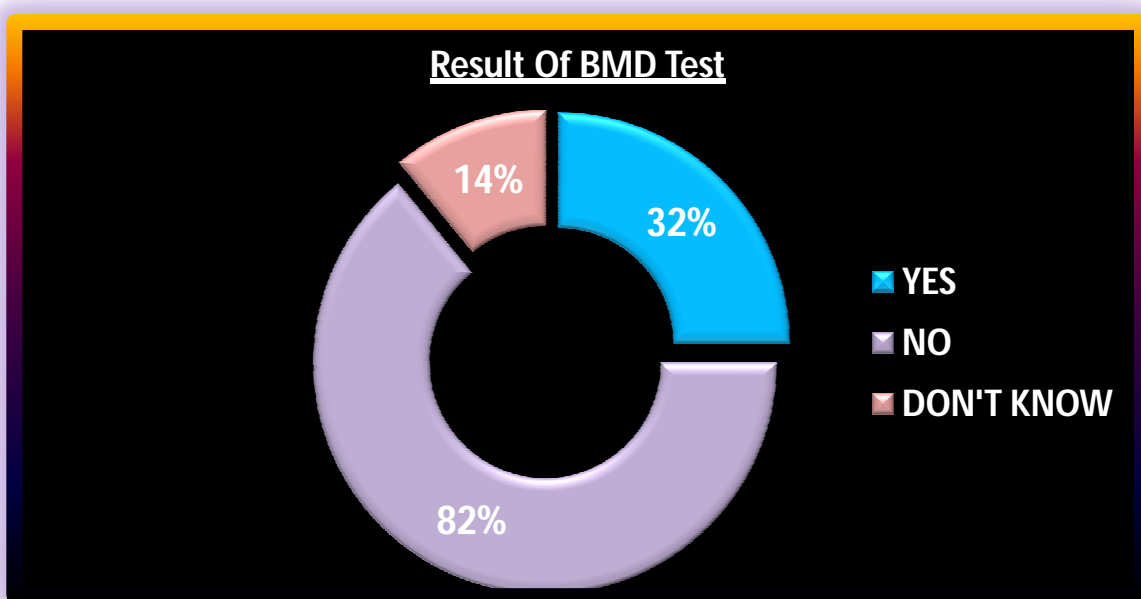
**Figure: 13 .Views about Bone Health Awareness Program**

Figure 13 describes the views of those who attended any awareness programs but most of them found those programs lacking importance. While, only 25% of the females told that the program they attended was beneficial and informative.



**Figure: 14. Percentage Awareness of Bone Mineral Density Exam**

A bone mineral density (BMD) test measures the density of minerals (such as calcium) in our bones. Bone density test tells us if we have normal bone density, using a special X-ray or computed tomography (CT) scan[26]. This information is used to estimate the strength of our bones. From the estimated data the mean level of awareness about Bone Mineral Density Test is only 14%. Females of Karachi showed negligence if their BMD tests and bone health is concerned. Our estimated results as shown in (Figure 14) showed that 86% of the participants were not even aware of BMD test and its significance. While only 14% of participants were aware of BMD test but none of them had it done in their whole life.



**Figure: 15. Result of BMD Test**

Basically, osteopenia is not considered as a disease but the risk to develop osteoporosis. It is sort of a warning sign to evoke osteoporosis in near future and describes low bone density. The most prominent test to diagnose osteopenia is BMD test because if bone density loss increases osteoporosis may develop [27].

The results analyzed, as shown in Figure 15, clearly signifies that 82% of the individuals were not involved in any such test in their whole life, while, only 32% of the people were known about these terms but they also had this test done but not diagnosed with such any disorder, and 14% showed that they were not known and not concern about these terms and BMD test.

## CONCLUSION

This can be included in the conclusive analysis of the survey that major portion of the total sample observed were not even concern about their bone health, and bone related issues. Most of the women, who took part in the survey depicted total negligence towards the bone concerning matters, regardless of fact that a healthy women leads a healthy family.

Therefore, we conclude that, decrease calcium and vitamin D intake, either from your diet, supplements, or less sunlight exposure can increase the risk for osteoporosis. Calcium and vitamin D are especially important for bone health. Most modifiable risk factors directly impact bone biology and result in a decrease in bone mineral density (BMD), but some of them also increase the risk of fracture independently of their effect on bone. These include, Alcohol/ smoking, low body mass index, poor nutrition, vitamin D deficiency, eating disorders, insufficient exercise, low dietary calcium intake, excessive radiation exposures.

## REFERENCES:

1. Lane NE (2006). Epidemiology, etiology, and diagnosis of osteoporosis. *Am J Obstet Gynecol.* 194(2 Suppl):S3-11.
2. North American menopause Society (2010). Management of osteoporosis in postmenopausal women: 2010 position statement of The North American menopause Society. *Menopause: The Journal of The North American Menopause Society*; Vol. 17, No. 1, pp. 23/2.
3. Koh LK, Sedrine WB, Torralba TP et al (2001). A simple tool to Identify Asian Women at Increased Risk of Osteoporosis. *Osteoporos Int.* ;12(8):699-705.
4. Weaver CM, Heaney RP (1999). Calcium. In: Shils M, Olson JA, Shike M, Ross AC, eds. *Modern Nutrition in Health and Disease*. 9th ed. Baltimore: Lippincott Williams & Wilkins; 1999:141-155.
5. Lips p, (2001). Vitamin D Deficiency and Secondary Hyperparathyroidism in the Elderly: Consequences for Bone Loss and Fractures and Therapeutic Implications. *Endocr Rev.*; 22(4):477-501.
6. Boonen S, Lips P, Bouillon R et al, (2007). Need for Additional Calcium to Reduce the Risk of Hip Fracture with Vitamin D Supplementation: Evidence from a Comparative Metaanalysis of Randomized Controlled Trials. *The Journal of Clinical Endocrinology & Metabolism*; 92:4, 1415-1423.
7. Cranney C, Horsely T, O'Donnell S, et al., (2007). "Effectiveness and safety of vitamin D". Evidence Report/Technology Assessment No. 158 prepared by the University of Ottawa Evidence-based Practice Center under Contract No. 290-02.0021. AHRQ Publication No. 07-E013. Rockville, MD: Agency for Healthcare Research and Quality.
8. Institute of Medicine, Food and Nutrition Board. *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: National Academy Press, 2010.
9. Tucker KL, Morita K, Qiao N, et al, (2006). Colas, but not other carbonated beverages, are associated with low bone mineral density in older women: The Framingham Osteoporosis Study. *Am J Clin Nutr.* ; 84:4, 936-942.

10. Rapuri PB, Gallagher JC, Kinyamu HK, and Ryschon KL, (2001). Caffeine intake increases the rate of bone loss in elderly women and interacts with vitamin D receptor genotypes. *Am J Clin Nutr.* ; 74 (5): 694-700.
11. Hernandez-Avila M, Colditz GA, Stampfer MJ, Rosner B, Speizer FE, and Willett WC, (1991). Caffeine, moderate alcohol intake, and risk of fractures of the hip and forearm in middle-aged women. *Am J Clin Nutr.* ; 54(1):157-163.
12. Vuori IM, (2001). Dose-response of physical activity and low back pain, osteoarthritis, and osteoporosis. *Med Sci Sports Exerc.*;33:551-586.
13. Kanis JA, Delmas P, Burckhardt P, Cooper C, Torgerson D, (1997). Guidelines for diagnosis and management of osteoporosis. *Osteoporosis International* ;7(4): 390-406.
14. Wariaghli G1, Allali F, El Maghraoui A, Hajjaj-Hassouni N, (2010). Osteoporosis in patients with primary biliary cirrhosis. *Eur J Gastroenterol Hepatol.*; 22(12):1397-401.
15. Sharon MM, (2008). Disorders Involving Calcium, Phosphorus, and Magnesium. *Prim Care.*; 35(2): 215-vi.
16. Lukert BP, Raisz LG, (1990). Glucocorticoid-induced osteoporosis: pathogenesis and management. *Ann Intern Med.*; 112:352-364.
17. Yun AJ, Lee PY, (2004). Maladaptation of the link between inflammation and bone turnover may be a key determinant of osteoporosis. *Med Hypotheses.*;63:532-537.
18. Mikuls TR, Saag KG, Curtis J, Bridges SL, Jr, Alarcon GS, Westfall AO, Lim SS, Smith EA, Jonas BL, Moreland LW, (2005). Prevalence of osteoporosis and osteopenia among African Americans with early rheumatoid arthritis: the impact of ethnic-specific normative data. *J Natl Med Assoc.*; 97:1155-60.
19. National Institutes of Health, NIH News Release, 2004. <http://www.nichd.nih.gov>.
20. National Institutes of Health, NIH News Release, 2009. <http://www.nichd.nih.gov>.
21. De Souza MJ, Miller BE, Sequenzia LC, Luciano AA, Ulreich S, Stier S, Prestwood K, Lasley BL, (1997). Bone health is not affected by luteal phase abnormalities and decreased ovarian progesterone production in female runners. *J Clin Endocrinol Metab.*; 82(9):2867-76.
22. Keen RW, Hart DJ, Arden NK, Doyle DV, Spector TD, 1999. Family history of appendicular fracture and risk of osteoporosis: a population-based study. *Osteoporos Int.*; 10(2):161-6.
23. Kaune WT, Miller MC, Linet MS, Hatch EE, Kleinerman RA, Wacholder S, et al., 2002. Magnetic fields produced by hand held hair dryers, stereo headsets, home sewing machines, and electric clocks. *Bioelectromagnetics* ; 23:14-25.
24. Cidem M, Bahadir C, Karakoc Y, Karacan I, 2012. Forearm Bone Mineral Density in Healthy Young Adult Mobile Phone Users. *Medicine Science* ;1(1):35-40.
25. Willey JS, Lloyd SA, Robbins M E, et al. 2008. Early increase in osteoclast number in mice after whole-body irradiation with 2 Gy X rays. *Radiation Research*; 170(3):388-392.
26. Pickhardt PJ, Pooler BD, Lauder T, del Rio AM, Bruce RJ, Binkley N, 2013. Opportunistic screening for osteoporosis using abdominal computed tomography scans obtained for other indications. *Ann Intern Med.*;158(8):588-95.
27. Ahmed AI, Blake GM, Rymer JM, Fogelman I, 1997. Screening for Osteopenia and Osteoporosis: Do the Accepted Normal Ranges Lead to Overdiagnosis? *Osteoporos Int.* ;7(5):432-8.