



Evaluation of the Vitamin D levels and its effect on cognitive function in menopausal women

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Abstract

The present study was planned by enrolling total 40 females. The patients visited to Out Patient Department (OPD) and in-patient department (IPD) in Patna Medical College from Nov 2017 to march 2018.were considered in the study. The 20 females were enrolled into the group A as Premenopausal women and 20 females were considered in the Group B as menopausal women without any complications.

There is relationship of Vitamin D's with cognitive dysfunction in the postmenopausal women may have significant implications in their health care, who are often the neglected part of the community. Hence based on the role of Vitamin D in the cognitive function in postmenopausal women's the current study was planned.

The data generated from the present study helped to assess basal levels of vitamin D in among menopausal women, giving us an idea regarding prevalence of vitamin D deficiency in menopausal women. Hence there should be proper counselling in the menopausal women's for the intake of Vitamin D. This will also minimize the exposure to the condition like osteoporosis.

Keywords: cognitive function, vitamin d, postmenopausal women

Introduction

Cognitive functioning is a term referring to an individual's ability to process to (thoughts) that should not deplete on a large scale in healthy individuals. It is defined as "the ability of an individual to perform the various mental activities most closely associated with learning and problem solving. Examples include verbal, spatial, psychomotor, and processing speed ability."^[1] Cognition mainly refers to things like memory, the ability to learn new information, speech, and understanding of written material. The brain is usually capable of learning new skills in the aforementioned areas, typically in early childhood, and of developing personal thoughts and beliefs about the world. Old age and disease may affect cognitive function, causing memory loss and trouble thinking of the right words while speaking or writing ("drawing a blank"). Multiple sclerosis (MS), for example, can eventually cause memory loss, an inability to grasp new concepts or information, and depleted verbal fluency. Not all with the condition will experience this side effect, and most will retain their general intellect and the ability.

Menopause, also known as the climacteric, is the time in most women's lives when menstrual periods stop permanently, and they are no longer able to bear children. Menopause typically occurs between 49 and 52 years of age. Medical professionals often define menopause as having occurred when a woman has not had any vaginal bleeding for a year. It may also be defined by a decrease in hormone production by the ovaries. In those who have had surgery to remove their uterus but still have ovaries, menopause may be viewed to have occurred at

the time of the surgery or when their hormone levels fell. Following the removal of the uterus, symptoms typically occur earlier, at an average of 45 years of age.^[2]

In the years before menopause, a woman's periods typically become irregular, which means that periods may be longer or shorter in duration or be lighter or heavier in the amount of flow. During this time, women often experience hot flashes; these typically last from 30 seconds to ten minutes and may be associated with shivering, sweating, and reddening of the skin. Hot flashes often stop occurring after a year or two. Other symptoms may include vaginal dryness, trouble sleeping, and mood changes. The severity of symptoms varies between women. While menopause is often thought to be linked to an increase in heart disease, this primarily occurs due to increasing age and does not have a direct relationship with menopause. In some women, problems that were present like endometriosis or painful periods will improve after menopause.^[3]

Menopause is usually a natural change. It can occur earlier in those who smoke tobacco. Other causes include surgery that removes both ovaries and some types of chemotherapy. At the physiological level, menopause happens because of a decrease in the ovaries' production of the hormones oestrogen and progesterone. While typically not needed, a diagnosis of menopause can be confirmed by measuring hormone levels in the blood or urine. Menopause is the opposite of menarche, the time when a girl's periods start.^[4]

Specific treatment is not usually needed. Some symptoms, however, may be improved with treatment. With respect to hot

flashes, avoiding smoking, caffeine, and alcohol is often recommended. Sleeping in a cool room and using a fan may help. The following medications may help: menopausal hormone therapy (MHT), clonidine, gabapentin, or selective serotonin reuptake inhibitors. Exercise may help with sleeping problems. While MHT was once routinely prescribed, it is now only recommended in those with significant symptoms, as there are concerns about side effects. [6] High quality evidence for the effectiveness of alternative medicine has not been found. There is tentative evidence for phytoestrogens. [5] The Efficacy of use of Calcium and Vitamin D in all postmenopausal women in terms of the prevention of fracture is uncertain. Use of calcium and vitamin D supplements is very common, with more than half of postmenopausal women taking them. There is a huge industry supporting the practice. The Annual worldwide sales of these supplements have been several billion dollars [6].

The doses of 400 to 800 IU per day vitamin D have little effect on bone mineral density, except among subject who have a deficiency of vitamin D [7]. The variation of the results from various studies of Calcium and Vitamin D supplementation in elderly women suggest that benefit of calcium plus vitamin D on bone mineral density or the risk of fracture is small and may vary from group to group and baseline Vitamin D status. Women taking supplemental vitamin D and calcium have a statistically increased incidence of renal stones, according to evidence from the Women's Health Initiative. For every 273 women who received supplementation during a 7-year follow up period, 1 woman was diagnosed with a urinary tract stone [8].

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Methodology

The present study was planned by enrolling total 40 females. The patients visited to Out Patient Department (OPD) and inpatient department (IPD) in Patna Medical College from Nov 2017 to march 2018 were considered in the study. The

20 females were enrolled into the group and as Premenopausal women and 20 females were considered in the Group B as menopausal women without any complications.

The approval of the institutional ethics committee was taken before starting the study. All the patients and their parents were informed consents. The aim and the objective of the present study were conveyed to them.

Following was the inclusion and exclusion criteria of the study:

Inclusion Criteria

- Females having Menopause; Females above age of 45 years.

Exclusion Criteria

- Females consuming drugs like oral contraceptives, statins, anticonvulsants, vitamin D or calcium supplementations and women with endocrine disorders.

All the women answered a question naire assessing the cognitive function by Mini-Mental State examination (MMSE) and Addenbrooke's Cognitive Examination – Revised (ACE-R) score.

In MMSE, functions such as registration, attention, calculation, recall, language (comprehension, reading, writing and naming), ability to follow simple commands, and orientation were examined. For MMSE, scores above 27 are considered normal and scores below 24 indicates impairment in cognition. [9] The ACE-R is a brief cognitive test that assesses five cognitive domains, namely attention/ orientation, memory, verbal fluency, language and visuospatial abilities. Total score is 100, higher scores indicates better cognitive functioning. Administration of the ACE-R takes, on average, 15 minutes. ACE scores 90 or above indicates normal cognition and scores below 90 indicates cognitive impairment [10]. ACE-R accomplishes standards of a valid dementia screening test, sensitive to early cognitively function.

Results & Discussion

The data from the total 40 females were collected and presented as below. The 20 females were enrolled into the group A as Premenopausal women and 20 females were considered in the Group B as menopausal women without any complications.

Table 1: Demographic Details

Group		Group A	Group B
		Premenopausal women (no. of Cases)	Menopausal women (no. of Cases)
Age	45-50 years	2	1
	50-55 years	3	2
	55-60 years	8	10
	60 years and above	7	7
Total		20	20
Body Mass Index		27.5 – 32.4	23.6 – 27.3
Waist Hip Ratio		0.81- 0.86	0.75 – 0.82

Table 2: Cognitive Function Assessment

Group	Group A	Group B
	Premenopausal women	Menopausal women
Vitamin D (ng/ml)	12.5 – 34.8	24.9 – 44.7
Mini-Mental State examination	17.2 – 25.6	23.4 – 27.3
Addenbrooke's Cognitive Examination – Revised	65.7 – 84.3	78.6 – 88.1

Table 3: Vitamin D Levels

Group	Group A	Group B
Vitamin D	Premenopausal women (no. of Cases)	Menopausal women (no. of Cases)
Insufficiency	6	7
Deficiency	14	13
Total	20	20

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Vitamin D is produced photochemically from 7-dehydrocholesterol in the skin of humans. Moderate sun exposure to the face, arms, and legs, averaging 5 to 30 minutes twice per week, can produce adequate amounts of vitamin D. The other source of vitamin D is diet and it is found naturally in very few foods. Main role of vitamin D is to maintain skeletal calcium balance by promoting calcium absorption in the intestines, promoting bone desorption by increasing osteoclast number, maintaining calcium and phosphate levels for bone formation, and allowing proper functioning of parathyroid hormone (PTH) to maintain serum calcium levels [11].

Serum concentration of 25(OH) D is the best indicator of vitamin D status. It reflects vitamin D produced cutaneous and that obtained from food and supplements and has a fairly long circulating half-life of 15 days [12].

In Harinarayan *et al* study with 164 postmenopausal women as the study population, a significant group of 52% had insufficient levels and 30% had deficient levels. Dietary intake of calcium was found to be inadequate. Similarly, in the present study, we found that 11% had vitamin D deficiency and 38% had insufficient levels and a significant correlation was found between vitamin D deficiency and inadequate dietary intake. Harinarayan *et al* also studied levels of serum alkaline phosphatase and PTH levels, which were found to be high in those with vitamin D deficiency [13].

Harinarayan *et al* also studied levels of serum alkaline phosphatase and PTH levels, which were found to be high in those with vitamin D deficiency. These parameters were not taken into consideration in our study. Schierbeck *et al* studied the relationship of vitamin D deficiency and adverse cardiovascular events, which was found to be significant [14]. Vitamin D deficiency was defined as serum 25(OH) D 50 nmol/L. Women with vitamin D deficiency had lower hip-waist ratio and high density lipoprotein and higher body mass index, triglycerides, PTH, and a trend toward higher fasting blood glucose. Dietary intake of calcium and vitamin D was found to be lower in the vitamin D deficient group when compared with vitamin D-replete women.

Vitamin D deficiency is increasingly recognized as a major health issue, particularly for women. Because of the dependency of the vitamin D receptor on estrogen, postmenopausal women are more susceptible to the deficiency state. However, because of lifestyle changes resulting in limited sunlight exposure, premenopausal women are also vulnerable. In premenopausal women, the consequences are increased risk of breast and colon cancers, and bone loss. In postmenopausal women, deficiency is exacerbated by the loss of estrogen and age related changes in the vitamin D receptor and vitamin D synthesis. The result is a further increased risk

of malignancy, bone loss, hypertension, diabetes, depression, falls and osteoporotic fractures.

Several mechanisms have been suggested linking the role of vitamin D and risk of cognitive dysfunction. The active form vitamin D is a secosteroid with multiple neurotropic and neuro protective functions in the central nervous system. Vitamin D plays a pivotal role in the development of brain as well as in adult brain function. All the cell types within the brain have the ability to synthesize active vitamin D. Both the vitamin D receptor and the enzyme required for the synthesis of active vitamin D are found in the adult human brain. At the molecular level, the brain has the ability to synthesize the active form of vitamin D within many cell types and regions with predominance in the hypothalamus and the large neurons within the substantia nigra [15]. Vitamin D contributes to neuro protection by modulating the production of nerve growth factor (NGF), neuro trophin, glialcell-derived neuro trophic factor (GDNF), nitric oxide synthase (NOS), and choline acetyl transferase [16].

The Quality of life of postmenopausal women can be improved when VDD can be timely prevented, early diagnosed and adequately managed.

Conclusion

The data generated from the present study helped to assess basal levels of vitamin D in among menopausal women, giving us an idea regarding prevalence of vitamin D deficiency in menopausal women. Hence there should be proper counselling in the menopausal women's for the intake of Vitamin D. This will also minimize the exposure to the condition like osteoporosis.

Our study indicates very high incidence of hypo vitaminosis D among postmenopausal women with osteoporosis. Prevention of vitamin D deficiency by appropriate diet, activity, sunlight exposure appears to be the primary prerequisite in reducing the incidence of osteoporotic fractures among postmenopausal women. Our study indicates very high incidence of hypo vitaminosis D among postmenopausal women with osteoporosis. Prevention of vitamin D deficiency by appropriate diet, activity, sunlight exposure appears to be the primary prerequisite in reducing the incidence of osteoporotic fractures among postmenopausal women.

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