

## Effect of Menopause on Balance Score

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### Abstract

**Background:** Menopause leads to a group of disorders affecting many physiological systems. This may increase risk of injury and poor quality of life of a female. Females have greater risks of injury rate than male counterparts and effect of menopause of females musculoskeletal system is evident. The aim of the study is to check whether any significant effect of menopause on balance score of a female. **Methodology:** 80 females participated in this study out of which 40 females were having their regular menstrual cycle and 40 females have reached to menopause. All females were between the age of 40-46 years and with normal BMI as per WHO i.e., between 18.5-24.9. Balance score was calculated using star excursion balance test and time up and go test. **Result:** Both the test concludes that balance score is significantly affected in females having menopause.

**Keywords:** Menopause; Musculoskeletal System; Menstrual Cycle.

### Introduction

The menopause marks a major life transition for women, an end to the childbearing years and the cessation of the menses. For some it can be an ill-defined concept associated with fear, loss, and sinister connotations, while for others it can be a welcome end to menstruation and the fear of unwanted pregnancy. Many premenopausal women have concerns that they will experience mental instability, sudden signs of aging, and diminution of sexuality at this time.

Unfortunately, the menopause is also an ill-defined concept for many medical practitioners. The World Health Organization defines menopause as the cessation of the menses for 1 year.

In fact, the term perimenopause, which is the time beginning immediately before the cessation of the menses and ending when the menses have been absent for 1 year, may be a more useful concept both for women and their practitioners. However, even many years before this stage, subtle changes in the

female reproductive cycle may be noticeable. This is suggested by factors such as declining fertility with increasing maternal age, shortening of the follicular phase of the menstrual cycle, long cycles, and change in the pattern of menstrual bleeding. Although these normal changes may not be detectable by blood hormone measurements, they may be worrying for some women and warrant information sharing and explanation. Women are more likely to experience mood and anxiety symptoms during the years preceding the cessation of the menses than they are after menstruation has ceased [1].

Bone loss increases after menopause. However, bone strength also depends on structural characteristics such as bone size. Whether bone size increases as a result of periosteal apposition and whether a strength index accounting for both bone density and bone size might predict the risk of fracture better than bone density alone are unclear [2].

Incidence of falls increases with advancing age. Most of the elderly persons who fall, experience complications like fractures, soft tissue injuries, limited mobility and fear of falling, all of which avert independence and quality of life prevention programs for falls require identifying the risk factors of falls. Falls are related to numerous risk factors and fall risk is directly proportional to the number of the risk factors present [3].

Postural imbalance is a major risk factor for falls. Nguyen et al., found that bone mineral density,

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postural sway and quadriceps strength were the important indicators of falls. Lord et al., showed that eyes closed postural sway, reaction time; lower limb proprioception and strength of ankle dorsiflexors were significantly divergent between multiple fallers and non-fallers. Wolfson et al, reported that the decline in balance ability in the elderly was most probably related to loss of strength in lower extremity and decline in sensorimotor functions [4, 5, 6].

Body weight reproductive factors [7] and life style factors are considered to affect age at natural menopause. Many studies which examine the relationship between body weight and the age at menopause, however, are of a cross-sectional nature. Therefore, caution is necessary when drawing any conclusion concerning cause effect relationships and a prospective study is needed to elucidate the cause effect relationships between body weight and age at menopause [2, 7].

When women were classified into three groups based on BMI at age 40 or 41, the age at menopause in those women in the upper 25% was significantly higher than in those in the lower 25%. Throughout the premenopausal period, only the trend in BMI in late menopausal women shifted upward compared to that in early menopausal women. These results confirm that BMI is related to age at menopause and clarify that the greater the BMI, the later the age at menopause [7].

Study done by Sundeep Khosla et al, concludes that the use of high-resolution 3-D pQCT imaging for analyses of bone microstructure in population studies and potentially for the clinical assessment of fracture risk. They find that, relative to women, men begin adult life with better trabecular microstructure and have less micro-structural damage with aging. Collectively, these findings may help explain the lower life-long risk of fractures in men, and specifically, their virtual immunity to age-related increases in wrist (Colles') fractures [8].

It has been seen that females do have more chances of fall than their male counterparts and this fall may increase post menopause therefore this study helps us to find that does balance gets significantly affected due to menopause among females.

Menopause occurs in most women around the age of fifty. During this period the end of ovulatory function occurs, with decreased estrogen production. The faster the ovarian failure, the higher the possibility of installing severe menopausal syndrome, which is well characterized after surgical castration [8, 9].

## Methodology

*Sample Size:* 80 females

### *Inclusion Criteria*

- ◆ Women of age between 40-46 years
- ◆ Females having normal menstrual cycle or menopause
- ◆ BMI between 18.5–24.9
- ◆ Normal ROM of hip knee and ankle joint

### *Exclusion Criteria*

- ◆ Any history of recent trauma in last 3 months to lower extremity
- ◆ Female on hormonal therapy
- ◆ Any diagnosed case of psychological / neurological / dermatological disorder
- ◆ Vestibular pathologies / infections

### *Instruments and Tool Used*

- ◆ Measuring tape
- ◆ Protractor
- ◆ Chalk
- ◆ Measuring ruler
- ◆ Foot ball
- ◆ Chair

### *Procedure*

120 females were contacted out of which 80 females were fulfilling inclusion criteria, they were included on the study.

*Group-A:* 40 females with menopause

*Group-B:* 40 females with regular menstrual cycle

Subjects were allocated in the groups as per set criteria and on first cum first basis. To maintain the baseline, both the groups were having same number of subjects.

After explanation of procedure of study, written consent was taken from each subject. Subjects were made aware about procedure of balance testing (star excursion balance test, time up and go test) and they were asked to kick the ball kept in front as this leg will be considered for movement in SEBT and data was collected for both the balance test procedures with at least 15 minutes gap between the two procedures.

Data was analyzed using unpaired t test for SEBT test for both the groups and time up and go test.

**Table 1:** Comparison of SEBT scores using t test

Groups	n	Mean (in cm)	SD	t-value	P-value
Group A females with menopause	40	349	55.44	7.714	000*
Group B females with regular menstrual cycle	40	450	69.77		

**Table 2:**

Groups	n	Mean (in cm)	SD	t value
Group A females with menopause	40	.1518	00688	
Group B females with regular menstrual cycle	40	.1059	00741	10.042**

## Discussion

The study compares the balance between two groups of females. One group is having normal menstrual cycle and the other group females are suffering from menopause. Star excursion balance test and time up and go test were used to analyze the balance score of females of both the groups. The present study suggests that females who have reached menopause are having significant difference in their balance score when compared with females having normal menstrual cycles.

Postural imbalance or body sway, apart from proprioceptive regulating mechanisms is also the function of central nervous system in terms of vestibule- cerebellar activity. So higher adiposity, which increases aromatase activity and subsequently boosts the conversion of androgens and estrogens could contribute to abnormal activation of the hypothalamic pituitary-gonadotropin axis of the central nervous system [5].

Ayşe Guler Okyay et al (January 2014) did a study on rats to demonstrate the biomechanical changes in rat bones occurred by surgical menopause and to search for correlation between biomechanical test results and bone mineral density (BMD) measurements. Which is concluded that bone quality was deteriorated and fragility was increased in rats, 6 months after surgical menopause? Sole BMD measurement might not be reliable in evaluation of osteoporosis and fracture risk. Biomechanical quality of bone is more important than its mineral content in determining fragility. That can be the reason for

decrease in balance score of females having menopause.

Frequency of falls in middle-late age groups is higher in women than in men [4]. Increased tendency to fall in elderly persons is related to decrease postural stability and is believed to be a result of impaired general health status [1]. Decreased postural stability is also observed in postmenopausal period. Fall incidence is three times higher in postmenopausal women than in men within the same age group. Estrogen withdrawal in menopause is suggested to avert postural stability via reducing the speed of information processing of the brain [10].

The removal of the ovaries produced systemic alterations, characterized by metabolic changes that caused weight gain and changes in bone tissue, associated with alteration of the mechanical profile and reduced bone mass.

When a woman's ovaries cease to produce estrogen, however, the receptors in various organs are deprived. This can occur as a result of natural menopause, premature menopause, or surgical removal of the ovaries prior to menopause. The following are some of the effects from loss of estrogen.

Naessen et al [18], showed that postmenopausal women who were taking estrogen pills for long periods had better postural balance than women who were not. This effect of estrogen on postural balance is most probably related to the effects on neuronal transmission in central nervous system. Besides central effects, long-term estrogen replacement therapy protects elements of connective tissue and muscle strength, upgrades quality of life and

emotional state of women and these effects are believed to ameliorate postural balance function indirectly [15, 16].

*Hot flashes, Skin dryness and wrinkles, Heart attack, Bone Loss and Osteoporosis, Dryness of the Vagina and Decreased Sexual Sensation, Bladder Infections*

All these things directly or indirectly may lead to decrease in balance score of a female therefore it may be the reason that females having menopause have low balance score so it is necessary to train females for balance even if they don't show any musculoskeletal symptoms.

Concurrently, in part due to the aging population, the burden of arthritis and musculoskeletal conditions as causes of pain and disability continues to increase. In Australia, these conditions have been identified as the third largest contributor to direct health expenditure (behind cardiovascular disease and neurological disorders) [9].

A low level of vitamin D in serum, which is a common public health problem, is associated with a decrease in muscle strength and physical function [6]. Previous studies demonstrated that increases in muscle strength and decreases in body sway in response to vitamin D might decrease the incidence of falling. As osteoporotic fractures occur due to falling, vitamin D could decrease the risk of osteoporotic fractures through its positive effects on bones, muscles, and balance [18].

A possible association has been reported between the weakening of the bone structure in osteoporosis patients and the occurrence of some muscular alterations that possibly lead to a change in center of gravity, which might result in loss of balance, falling, and fractures [19].

As menopause is there females have tendency to increase weight which lead to balance deficiency so females are to be encourage to maintain their weight among normal BMI though the present study concluded that female will be effected with decrease in balance score as soon as they reach menopause.

Independent individuals will also experience decline in physical capabilities and functions as their age advances, so the target population of rehabilitation should also be individuals at younger age group.

Therefore, the vitamin D levels should be kept in mind for physical therapy modalities and vitamin D treatment approaches, especially in postmenopausal osteoporosis patients suffering from balance problems who receive traditional physical therapy

management. The risk of falling should be assessed in postmenopausal females with osteoporosis by inexpensive and easily performed techniques such as measurement of back extensor, hip flexor, foot flexor, and extensor muscle strengths and lumbar ROM. The findings presented here also suggest that bone mineral density, vitamin D levels, balance, lumbar ROM, and muscle strengths are factors that affect quality of life.

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