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Insulin and Vitamin D Level in Menopausal and Pre Menopausal Women in Umuahia Metropolis

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Abstract

This study was carried out to determine insulin and vitamin D level in menopausal and pre menopausal women in Umuahia metropolis, State. The survey involves 30 menopausal and 30 premenopausal women. Out of twenty sample examined, the result showed mean+ standard deviation of insulin level of 9.10±4.30iu/mg and vitamin D level of 29.20±5.10ng/ml in menopausal women while insulin level of 11.00±6.00iu/mg and vitamin D level 31.40±1.00ng/ml in pre menopausal women respectively. This observed difference by statistically significant (p=0.05).the decrease in the serum insulin and vitamin D level in menopausal women was as a result of hormonal changes and the inability of the body to make use of carbohydrate food this age. It is therefore, recommend that menopausal and pre menopausal women should be on consistent consumption of vitamin D from diet and supplements to prevent the occurrence of those metabolic changes.

Keywords: Insulin; Vitamin D; Menopausal and Pre menopausal women; Umuahia metropolis

Introduction

Menopause also known as the climacteric is the time in most women's lives when menstrual periods stop permanently, and she is no longer able to have children [1]. Menopause typically occurs between 45-60 years of age. Medical professionals often defined menopause as having occurred when a women has not had any vaginal bleeding for a year [2].

Menopause may be viewed to have occurred at the time of surgery or when hormone level fall. Following the removal of the uterus, symptoms typically occurs earlier, at an average of 45 year of age. 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 while menopause is often linked to an increase in heart disease, this primarily occurs due to increasing age and does not have direct relationship with menopause. In some women, problems that were previously present like endometrosis or painful periods will improve after menopause. At the physiological level, menopause happens because of decreases in the ovaries' production of the hormones estrogen and progesterone [1].

Pre-menopause means "around menopause" and refers to the time period during which a woman's body makes its natural transition towards permanent infertility (menopause). Women start premenopause at different ages; you may notice signs of progression toward menopause, such as menstrual irregularity, sometimes in you but some women notice changes as early as mid-30s. The levels of estrogen- the main female hormone rises and falls unevenly during pre-menopause, menstrual cycle, may lengthen or shorten, and you may begin having menstrual cycles in which you ovaries do not release an egg. You may also experience menopause –like symptoms, such as hot flashes, sleep problems and vaginal dryness etc. Once you have gone through 12 consecutive months without a menstrual period, you have officially reached menopause and the pre-menopause period is over [3].

The deficiency of vitamin D in menopausal women causes osteoporosis, cancer, diabetes, parathyroid problems, immune function and even weight loss. But the supply of vitamin D with as little as a couple of hours per week in the sun-provided the UVB rays are strong enough and it can also be ingested harvested salmon, will help to prevent the occurrence of this disease.

Premenopausal women have a lower risk for osteoporosis than the menopausal women if they are vitamin D deficient. During premenopause, there is an increase in the proportion of cycles that are anovulatory. However, the mechanisms responsible for premenopause, ovarian function appear to be highly variable. Length of menses and the intermenstrual interval

leanes and anovulatory cycles become more common. Hormone level may fluctuate widely during this time and as estrogen levels decrease some of the inherent protective effects of estrogen on bone health and endothelial function may also decrease. Thus, the hormonal changes associated with aging may have both short and long detrimental effects that must be recognized, addressed and amehorated when possible [4].

Insulin is a peptide hormone produced by beta cells in the pancreas. It regulates the metabolism of carbohydrates and fats by promoting the absorption of glucose from the blood to skeletal muscles and fat tissue and by causing fat to be stored rather than used for energy. Insulin also inhibits the production of glucose by the liver. Insulin is provided within the body in a constant proportion to remove excess glucose from the blood, which otherwise would be toxic. When control of insulin levels fails, diabetes mellitus can result. As a consequent, insulin is used medically to treat some forms of diabetes mellitus. Insulin is a very old protein that may have originated more than a billion years ago.

The molecular origins of insulin go at least as far back as the simplest unicellular eukaryotes. In addition, insulin has several other metabolic effects (such as stopping the breakdown of protein and fat. Insulin works with glucagon hormone, while insulin lowers blood sugar levels if needed, glucagon's is to raise blood sugar levels.

Vitamin D also known as sunshine vitamin is a fat-soluble vitamin that is associated with bone health. It is well recognized that vitamin D deficiency leads to rickets in children an osteomalacia and osteoporosis in adult [5]. Vitamin D plays a role in rennin production in the kidney, insulin production in the pancreas, production of catlelectidin in macrophage and growth and proliferation of both vascular smooth muscle cells and cardiomyocytes [6].

Low serum vitamin D level has been proven to be correlated with type 2 diabetes mellitus. It is known that normal insulin secretion in pancreatic B-cell depends on vitamin D. A reduction in vitamin D level can result in an increase in insulin resistance and reduction in insulin secretion [7]. Other mechanisms by which vitamin D may protect against cardiovascular disease is through decreased level of triglycerides and low-density lipoprotein cholesterol. This is possible as vitamin D increases the lipoprotein lipase activity in adipocytes [8]. In addition, improving vitamin D level will reduce the risk of developing type 2 diabetes mellitus and this will further reduce the lipoprotein disorder thus reducing the risk of cardiovascular diseases [9].

In summary, this study sought to determine insulin and vitamin D in premenopausal and menopausal women.

Aim

To determine serum level of vitamin D and insulin in menopausal and premenopausal women in Umuahia Metropolis.

Objectives

a. The objective of this study include:

b. To determine insulin and vitamin D level in premenopausal women with reference to Body Mass Index (BMI)

c. To determine insulin and vitamin D level in menopausal women with reference to Body Mass Index (BMI).

Materials and Methods

Study area

The study was conducted within Umuahia Metropolis, Abia State of Nigeria.

Subjects

A total of 20 subjects were used for the study comprising 10 menopausal women who serve as test subjects and 10 premenopausal women who served as control subjects.

Inclusive criteria

The age range of premenopausal (30-40years) and menopausal (45-60years) women was included in the study.

Exclusive criteria

The pregnant women, individual with diabetes were not involved in this study to avoid their influence on vitamin D and insulin.

Determination of Insulin

Insulin level was determined using euroimmun

Procedure: Format the micro-plates wells for calibrator, control and patient specimen to be assayed in duplicate, pipette 0.050ml (50ul) of the appropriate calibrators, controls and samples into the assigned wells. Add 0.100 (100ul) of the insulin Enzyme Reagent to each well, swirl the micro plate gently for 20-30 second to mix and cove with a plastic wrap. Incubate for 120minutes at room temperature (20-370C) and discard the content of the microplate by decantation or aspiration. If decanting, tap and blot the plate dry with absorbent paper, add 350ul of wash buffer, decant (tap and blot) or aspirate, and finally add 0.100ml (100ml) of working substrate to all wells and incubate at room temperature for 15mins. Add 0.050ml (50ul) of stop solution to each well and mix gently for 15-20seconds. Read the absorbance in each well at 450nm (using a reference wavelength of 620-630nm to minimize well imperfections) in a microplate reader.

Determination of vitamin D: Vitamin D was determined in samples using the Euroimmun (25-Oh vitamin D ELISA).

Procedures: Pipette 200ul of sample diluted in biotin sample buffer into each of the microplate wells. Incubate for 2hours at room temperature (+180C to +250C), Empty the

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wells and subsequently washed 3 times using 300ul of working strength wash. Pipette 100ul of enzyme conjugate (steptavidin-peroxidase) into each of the wells and incubate for 30 minutes at room temperature (+180C to +250C) empty the wells, wash as described. Pipette 100ul of chromogen substrate solution into each of the microplate wells, incubate for 15minutes at room temperature (+180C to +250C) (protect from direct sunlight. Pipette 100ul of stop solution into each of the microplate wells in the same order and at the same speed as the chromogen (substrate was introduced, measure the intensity at a wavelength of 450nm and a reference wavelength between 620nm and 650 within 30mins of adding the stop solution.

Sample collection and preparation

Blood samples were collected aseptically by vein puncture with a plain redtop tube without additives or anticoagulants and a 5ml sterile disposable hypodermic syringes and needles from patient who constituted the subject and was disposed into a pre-labeled plane dry specimen container. The sample was centrifuged at 3,000rpm for 5mins to separate and to obtain the serum. The serum were extracted using a pipette and was introduced into another specimen container, and stored at 200C until required for both vitamin D and insulin determination.

Result

A total of sixty (600) subjects were recruited for the study, Comprising thirty (30) menopausal women and thirty (30) premenopausal women. Age range of menopausal women was (45-60years) while age range of premenopausal women was (30-40years). Results obtained are summarized as follows;

Table 1: Showing Insulin and vitamin D level in premenopausal and menopausal women with statistical evaluation n = 30 for premenopausal and n = 30 for menopausal women.

Parameter	Premenopausal Women	Menopausal Women	P-value
	Mean±S.D	Mean±S.D	
Insulin (iu/mg)	11.00±6.00	9.10±4.30	0.257
Vitamin D (ng/ml)	31.40±1.00	29.20±5.10	0.066

In Table 1 showing insulin and vitamin D level in menopausal and premenopausal women. There was no statistically significant different (p=0.257) in the mean level of insulin in premenopausal and menopausal women. The mean levels of vitamin d in both groups was also not statistically different (p>0.05) (Figure 1 &2).

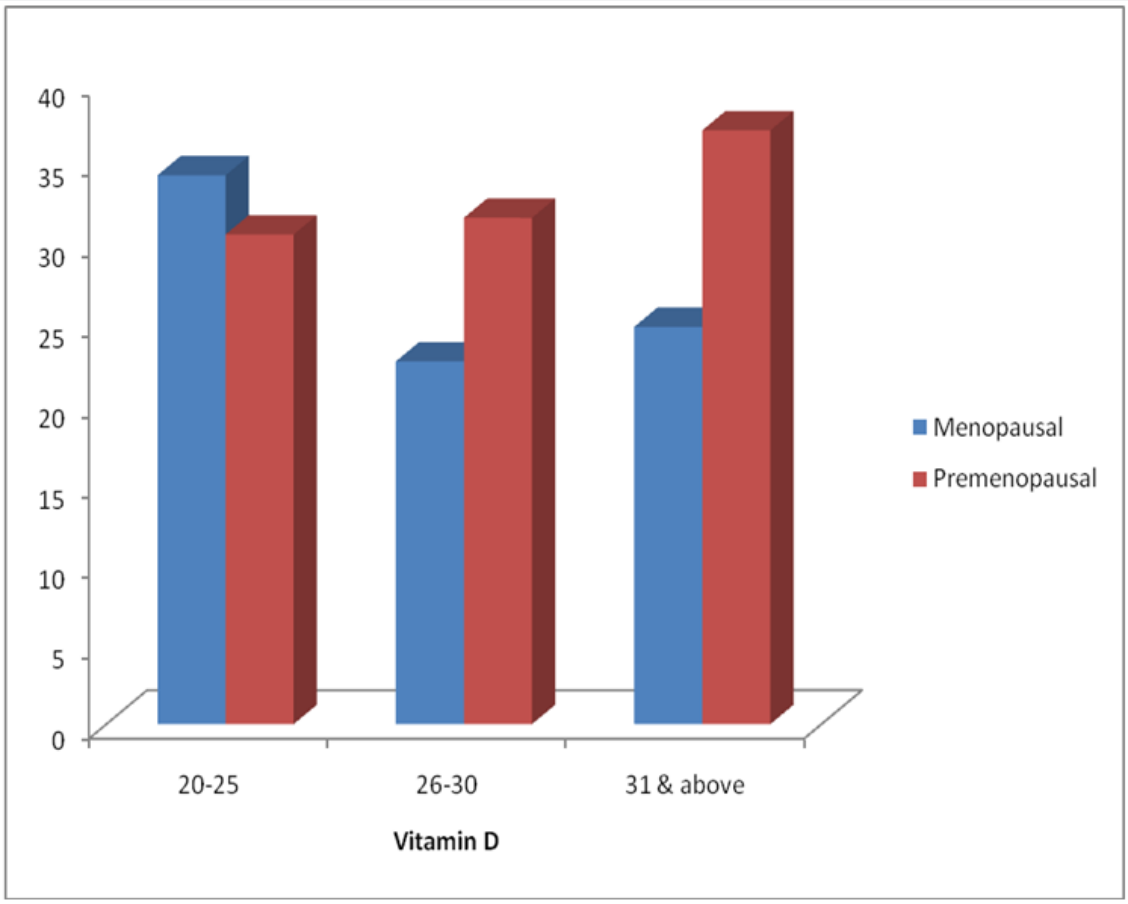

Figure 1: Showing Vitamin D level in Menopausal and Premenopausal women in relation to Body Mass Index (BMI).

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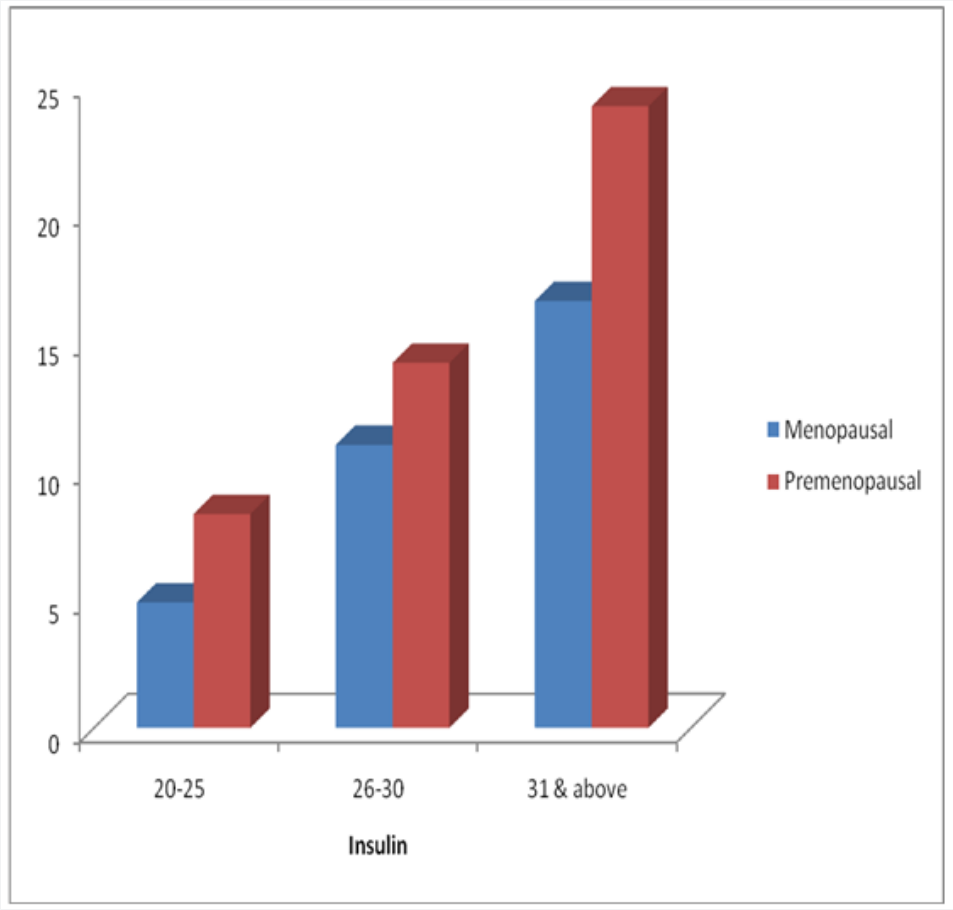

Figure 2: Showing Insulin level in Menopausal and Premenopausal women in relation to Body Mass Index (BMI).

Table 2: showing insulin and vitamin D level in premenopausal women in relation to Body Mass Index (BMI).

Parameter	20-25	26-30	31 and above	P-Value
	Mean±S.D	Mean±S.D	Mean±S.D	
Inslun (iu/mg)	8.29±9.24	14.15±15.91	24.1±1.00	0.381
Vitamin (ng/ml)	30.51 ±15.1	31.55±3.75	37.00±1.00	0.912

In Table 2 showing insulin and vitamin D level in premenopausal women reference to Body Mass Index (BMI). The mean level of insulin and vitamin D in premenopausal women was not statistically different (P>0.05).

Table 3: Showing insulin and vitamin D level in menopausal women in relation to Body Mass Index (BMI).

Parameter	20-25	26-30	31 and above	P-value
	Mean ±S.D	Mean±S.D	Mean± S.D	
Insulin 1.82(iu/mg)	4.86±1.94	10.79 ± 6.67	16.55 ± 9.55	0.077
Vitamin D (ng/ml)	34.20±9.59	22.60±	24.75±3.46	0.001

In Table 3 showing insulin and vitamin D level in menopausal women with reference to Body Mass Index (BMI). There was no statistically significant different (P=0.077) in the mean level of insulin in menopausal. /the mean level of vitamin D was statistically significant (P<0.05).

Discussion

In this study, insulin and vitamin level was found to be quite significantly decreased in menopause women compare to premenopause women. This decreased in vitamin D is as a result of the depletion of the estrogen that unregulates both the 1-a-hydroxylase enzyme which converts 25(OH), to 1-25 (OH)2 D and increases levels of vitamin receptor protein, thus leading to vitamin D deficiency [10]. And the decreased in the level of insulin is as a result of the absence of estrogen which helps to offset insulin thus leading to diabetes mellitus [11].

Vitamin D and insulin are associated with diseases such as diabetes mellitus, hypertension, hypalipidomia and cardiovascular diseases [12]. Sufficient vitamin D levels have also been associated with the ability of the body to use insulin and also help to prevent type 1 & 2 diabetes mellitus, heat diseases, high blood pressure and weight gain as well.

Li et al. [13] documented that a decreases in vitamin D can result in an increase in insulin resistance and a reduction in insulin secretion in menopause women.

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In this study, it is observed that there is an increase level of body mass index. Hutchinson [14] documented that weight gain associated with menopause typically involves increased amount of fat around the abdomen, and this is because insulin and cortisols when combine together in high amount over a long periods will push the female physiology towards storing fat when calories are high.

According to Arunabh et al. [15] stated that body mass index (obesity ≤30kg/m) increases the risk of vitamin D deficiency. Once vitamin D is synthesized in the skin, it can be sequestered in body fat stores making it bo-available to people with higher body mass index. Moreover, vitamin D supplementation trials have shown that obese people reached much lower level of serum 25-hydroxylvitamin D level compare to normal weight [16].

In this study insulin and vitamin D tends to be decreased in menopausal women than premenopausal women as a result of the hormonal changes that occur during this age. And also the menopausal women had higher body mass index than premenopausal women.

Conclusion

From this study insulin and vitamin D level is more decreased in Menopausal women than in premenopausal women. Decreased levels of insulin can cause diabetes mellitus and decrease level of vitamin D causes hypertension, osteoporosis, cardiovascular diseases, hyperlipidemia to menopausal and premenopausal women. Premenopausal women with vitamin D deficiency are of a lower risk for osteoporosis than menopausal women. It is therefore advised that menopausal women should be in consistent consumption of more vitamin D from diet and supplements and also premenopausal women to avoid the risk of the disease that would arise.

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