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Cognitive impairment at the stage of menopause in women with type 2 diabetes

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Abstract: Severe impairment of cognitive function characterizes dementia. Mild cognitive impairment represents the transition between normal cognitive process and dementia. The frequency of cognitive changes is higher in women than in men. Based on this fact, hormonal factors likely contribute to cognitive decline. In this sense, cognitive complaints are more common during menopause, a phase characterized by a decrease in hormone levels, especially estrogen. In addition, a trend towards cognitive decline in postmenopausal women has been reported. Vasomotor symptoms (hot flashes, sweating, and dizziness), vaginal dryness, irritability, and forgetfulness are common and are associated with a progressive decline in ovarian function and a subsequent decrease in serum estrogen concentrations. Estrogen-based hormone therapy (HT), with or without progestogen, is the treatment of choice for relieving menopausal symptoms. Studies conducted to date have shown conflicting results regarding the effects of HT on cognitive function. This article reviews key aspects of menopause and cognitive function, including the neuroprotective role of estrogen and the relationship between menopausal symptoms and cognitive function. We present and discuss the results of central observational and interventional studies of HT and cognition.

Keywords: menopause, menopause, cognitive impairment, diabetes mellitus, menopausal hormone therapy, estrogen

To determine the deterioration of cognitive impairment in women with type 2 diabetes in the menopausal period.

Relevance: Severe impairment of cognitive function characterizes dementia. Mild cognitive impairment represents the transition between normal cognitive process and dementia. The frequency of cognitive changes is higher in women than in men. Based on this fact, hormonal factors likely contribute to cognitive decline. In this sense, cognitive complaints are more common during menopause, a phase characterized by a decrease in hormone levels, especially estrogen. In addition, a trend towards cognitive decline in postmenopausal women has been reported. Vasomotor symptoms (hot flashes, sweating, and dizziness), vaginal dryness, irritability, and forgetfulness are common and are associated with a progressive decline in ovarian function and a subsequent decrease in serum estrogen concentrations. Estrogen-based hormone therapy (HT), with or without progestogen, is the treatment of choice for relieving menopausal symptoms. Studies conducted to date have shown conflicting results regarding the effects of HT on cognitive function. This article reviews key aspects of menopause and cognitive function, including the neuroprotective role of estrogen and the relationship between menopausal symptoms

and cognitive function. We present and discuss the results of central observational and interventional studies of HT and cognition.

Purpose. To determine the deterioration of cognitive impairment in women with type 2 diabetes in the menopausal period. **Results:** In our study, according to the test result on the MoCA scale in 6 women with type 2 diabetes in the menopausal period, 83% of the patient scored less than 26 points, which is below the norm, their average score was 22.5 ± 2.9 on average, this result showed moderate cognitive impairment, in the control group, 6 women had mild cognitive impairment (their average score was 23.48 ± 1.04 , 73% of patients scored less than 26 points, which is below the norm). And also to determine the depressive state, a BEKA test was performed, which is estimated by points from 0 to 63. According to the test result in women with type 2 diabetes, in 2 women the result was up to 15 points - this was assessed as mild depression (subdepression), in 2 women from 16 to 19 points - this was assessed as moderate depression, in one woman 29 points were determined - this was assessed as severe depression, and in one woman 39 points was severe depression. In the control group, 2 women according to the test results are assessed as no depression, in 3 women the result is assessed as moderate depression.

Table 1

	SD type 2 female. = 6	Control =6	p
St. T4	$1,3 \pm 0,3$	$1,01 \pm 0,21$	$p=0,78$
TSH	$1,4 \pm 0,5$	$1,2 \pm 0,3$	$p=0,9$
LH (Me [IQR])	$25,9 \pm [2,0;50,6]$	$28,3 [5.4;59,6]$	$p=0,08$
Testosterone	$0,5 \pm 0,2$	$0,71 \pm 0,2$	$p=0,05$
FSH	$34,6 [2.01;80,3]$	$41,2 [20.5;148.4]$	$p=0,001$
AMH(Me [IQR])	$0,01 [0,01,0,7]$	$0,198 [0,1;1,2]$	$p=0,001$
Estradiol (Me [IQR])	$60,9 [18,3;688,7]$	$78,1 [29,8;791,3]$	$p=0,001$

As can be seen from Table 1, we divided the patients into two large groups, the first group is sick women with type 2 diabetes in the menopausal period, the second group is the control women in the menopausal period without diabetes. In our study, the results of hormonal analyzes showed that there were no significant differences in both groups, such as Ft4, TSH, LH, FSH. And also the median (Me) of AMH was 0.01, the difference between the 1st and 3rd quartiles was from 0.0100 to 0.7, the median (Me) of estradiol was 60.9, the difference between the 1st and 3rd quartiles ranged from 18.3 to 688.7.

Glycemic profile in women with type 2 diabetes in the menopausal period against the background of CVD:

Table 2

Glycemic profile:	
7:00	$8,9 \pm 2,45$
10:00	$10,23 \pm 3,9$
13:00	$10,57 \pm 3,3$

17:00	11,8±4,96
20:00	12,43±4,90

As can be seen, in women with type 2 diabetes in the menopausal period against the background of SSP, glycemia varied during the day on average from 8.9±2.45 to 12.43±4.90

Glycolized hemoglobin in the study group of women with type 2 diabetes in the menopausal period ranges from 6.2-12.8%, averaging 9.5±2.6%.

Lipid spectrum: OX- ranged from 4.9-8.4 mmol-l, averaged 6.4±1.4 mmol-l;

Triglycerides - ranged from 1.1-4.2 mmol-l, averaged 2.9±1.06 mmol-l;

HDL-ranged from 0.7-1.4 mmol-l, averaged 1.4±0.7 mmol-l;

VLDL-ranged from 0.3-1.3 mmol-l, averaged 0.9±0.3 mmol-l;

LDL fluctuated from 2.3-3.5 mmol-l, averaging 2.8±0.4 mmol-l;

Vitamin D - ranged from 10.0-55.8, averaged 20.1±17.7

Blood calcium - ranged from 2.0-2.6, averaged 2.3±0.16

Conclusion: Based on our study, we can say that in women with type 2 diabetes in the menopausal period, due to fluctuations in glycemia, estrogen and AMH decrease much lower than in women without type 2 diabetes, and this shows that in women with type 2 diabetes, the menopausal period occurs more in younger age than in women without DM. In women with type 2 diabetes in the menopausal period, estrogen and AMH were much lower than in women without DM and this indicates that due to the decrease in ovarian function, there is a progressive decrease in serum estrogen levels, which leads to menopausal symptoms with an emphasis on vasomotor symptoms. In addition to these symptoms, cognitive impairment can manifest itself in postmenopausal women to varying degrees. In our study, cognitive complaints are more common in postmenopausal women with type 2 DM than in premenopausal women without DM, and this was proven in our study by the result of the MoCA test.

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