

Clinical features of Diabetes mellitus in postmenopausal women; an observational study

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ABSTRACT

Objective: Menopause is one of the most significant event, which causes many bodily changes that have an ongoing impact on a woman's life. Menopause is also linked to a poor metabolic profile and a higher chance of developing type 2 diabetes. The purpose of this study was to evaluate the postmenopausal symptoms that women with type 2 diabetes experienced.

Methodology: This study was a multicenter cross-sectional study that was conducted using a non-probability sampling technique. The duration of the study was about six months, from August 1, 2022, to January 31, 2023. The study included 360 postmenopausal women with type II diabetes mellitus who were between the ages of 40 and 60. Menopause status, postmenopausal symptom experience, health status, coexisting diseases, diabetic symptoms, and socio-demographic factors including age, gender, and socioeconomic status, were documented, height, and weight were also noted in order to compute body mass index (BMI).

Results: The study findings showed that the mean age was 60.69 ± 10.21 years, and the mean BMI was 24.22 ± 8.42 kg/m². Dermatological manifestations such as dry, cracked skin was observed in 264(73.3%) women. Shortness of breath was observed in 276(76.7%) women. Mood swings were observed in 276(76.7%) women. Around 186(51.7%) had trouble in reading or seeing faraway objects, visual disturbances was reported in 192(53.3%) women. The majority of the women 274(76.1%) urinate three times at night. Tingling or numbness 196(54.4%), swelling of hands or feet 264(73.3%), burning pain 264(73.3%), muscular pain 336(93.3%), too sensitive feet on touch 134(37.2%) were also noticed.

Conclusion: This study concluded that the fatigue, and muscular pain or cramps in legs or feet were the most prevalent symptoms, followed by visual disturbances, shortness of breath, chest tightness, dry and cracked skin, appetite loss, and slow or delayed healing of wounds in postmenopausal women with diabetes.

Keywords: Postmenopausal symptoms, clinical features. type II Diabetes.

INTRODUCTION

Menopause is defined as the oocyte depletion-related irreversible cessation of menstruation [1, 2]. It signifies the end of a woman's reproductive life and is marked by a significant decline in endogenous estrogen production. In addition to hormonal changes following menopause, women also have phenotypical and biochemical alterations that may increase their risk of developing type 2 diabetes (T2DM) [1, 2].

Epidemiological studies show a progressive rise in the prevalence of diabetes mellitus, with type 2 diabetes (T2DM) making up more than 90% of all diabetic patients [3]. Postmenopausal women are more likely to acquire T2DM [4], and T2DM raises the chance of peri-menopause [5]. The most prevalent chronic condition in postmenopausal women, T2DM, is a significant contributor to cardiovascular disease and the leading reason of death of women in Western countries [6]. Because of the complexity of T2DM's etiology, established risk factors do not fully explain both its physiological and clinical processes. According to Chinese T2DM prevention guidelines, diabetes is a risk factor for Asians and is influenced by ageing, obesity, and other demographic factors [3]. Retrospective data analysis of 29,189 males, 6308 premenopausal women, and 4570 postmenopausal women in Japan was done in 2013 by Heianza Y et al. They discovered that abnormal blood glucose levels were substantially linked with postmenopausal status. Blood glucose levels in females who are past menopause or older may be abnormally increased [7]. According to some studies, the etiology of T2DM may currently be influenced by endogenous levels of sex hormones [8].

Weight gain, particularly central obesity and an increase in waist circumference, is linked to the transition from pre- to post-reproductive life [1, 2]. Beyond the buildup of central fat, sarcopenia and decreased muscular mass that are linked to menopause also contribute to the alteration in body weight [1,2, 9]. Scientific debate has centered on whether these abnormalities are also influenced by ovarian ageing in addition to being caused by chronological ageing [10,11].

Major studies' first findings indicated that poor glucose metabolism after menopause was not caused by a drop in estrogen levels, but rather was simply the result of ageing chronologically [12]. One observational study from China showed that menopause occurred before the age of 45 and was linked to a 20% higher risk of type 2 diabetes than menopause did on average age [13]. Studies on women who have undergone ovariectomy have revealed that their risk of T2DM is approximately to 57% greater than for women who have not suffered ovariectomy [14].

The menopausal symptom variations in women with T2DM, a chronic health condition that is becoming more prevalent in middle age, are little understood [15]. According to earlier research, chronic illness may negatively impact the postmenopausal experience [16,17]. Many of the symptoms of diabetes are similar to those that indicate the ending of reproductive age. For instance, menopausal transition and diabetes both share comparable symptoms such as vaginal discomfort, [18] urine leakage, and disrupted sleep [19]. Furthermore, one of the most worrisome postmenopausal complaints, the severity of hot flashes, has been linked to the poor glycemic control of diabetes [20].

Despite such past research, the relationship between menopause and diabetes has not been examined in a population of the United States (U.S.), where prevalence of diabetes are high. While levels of anxiety and sleep disruptions were comparable between diabetic women and controls in one study of menopausal symptoms conducted in Mexico, depression rates were greater [21]. Finally, Cengiz H and colleagues demonstrated that postmenopausal individuals with the metabolic syndrome (hot flashes, insomnia, muscle and joint aches) had a greater incidence of somatic menopausal symptoms than unaffected controls [22]. However, glucose control was not assessed as a potential contributor. [22].

There is scarce data available on the relationship between menopause and the risk of T2DM in women with various metabolic types. The purpose of this study was to evaluate the postmenopausal symptoms that women with type 2 diabetes experienced.

METHODOLOGY

This study was a multicenter cross-sectional study that was conducted using a non-probability sampling technique. The duration of the study was about six months, from August 1, 2022, to January 31, 2023. The ethical approval was obtained from the ethical review board of the concerned hospital. The study included 360 postmenopausal women with type 2 diabetes mellitus who were between the ages of 40 and 60. Whereas pregnancy, severe weight loss, other pathological causes for termination of menstruation, type 1 diabetes, compromised fasting glucose, diminished glucose tolerance, surgical procedures, chemotherapy, or radiation-induced early menopause, and women treated with hormone replacement therapy were excluded from the study.

Women with diabetes were identified by using their latest HbA1c as a measure of glycemic control. Menopause status, postmenopausal symptom experience, health status, coexisting diseases, diabetic symptoms and, socio-demographic factors including age, gender, and socioeconomic status, were documented. Height, and weight were also noted to compute body mass index (BMI). Additionally, tension, anxiety, and depressive symptoms were also evaluated. Researcher measured blood pressure, respiratory rate and pulse rate. The maximum blood pressure after 3 measurements was noted; the pulse rate was measured constantly, and three readings were averaged. Information about recent medical history and history of sleep disorders was collected through a questionnaire (insomnia, abnormal movements or behaviors during sleep, and an inability to sleep at the desired time). Current reports of Random blood sugar, and related biochemical parameters, including total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C), were also documented.

Data was entered and analyzed by using SPSS version 20.0. Continuous variables were computed as means and standard deviation. Different demographic parameters (sex, age, clinical features associated with diabetes type 2) were documented as frequencies and percentages.

RESULTS

A total of 360 post-menopausal diabetic women were included in the study. The mean age was 60.69 ± 10.21 years. The mean weight was 68.64 ± 16.10 kg. The mean height was 68.30 ± 10.29 inches. The mean BMI was 24.22 ± 8.42 kg/m². The mean respiratory rate was 19.45 ± 5.76 breath/min. The mean temperature was 77.64 ± 22.36 °F. The blood pressure was 187.05 ± 54.08 mm Hg. The mean heart rate was 87.11 ± 9.85 beats/min. The mean RBS was 284.83 ± 92.13 , as shown in Table I.

The majority of women 238(66.1%) were middle-class, with low-income women 110(30.6%) coming in second. Comorbidities revealed, 312(86.7%) had hypertension, 276(76.7%) had dyslipidemia, and 72(20.2%) had history of depression. Most women 222(61.7%) were physically active, as shown in Table II.

The prevalence of renal manifestation in postmenopausal diabetic women revealed that 74 (20.6%) of the women urinate frequently, the majority of the women 274(76.1%) urinate three times at night, and 86(23.9%) urinate every two hours. Light-colored urine was observed in 250(69.4%) while dark yellow urine was observed in 110(30.6%) women. Blood pressure control becomes worse in most of the women 248(68.9%), as shown in Table III.

The prevalence of ocular manifestations in postmenopausal diabetic women revealed that flashes were observed in only 48(13.3%) women, 96(26.7%) had blind spots, distortion was seen in 116(32.2%) women, night blindness was reported in 98(27.2%), eye floaters was seen in 142(39.4%) women, around 186(51.7%) had trouble in reading or seeing faraway objects, visual disturbances was reported in 192(53.3%) women. Blurred vision and vision loss was observed in 156(43.3%) and 162(45.0%), respectively. Respiratory manifestations in postmenopausal diabetic women revealed that shortness of breath was observed in 276(76.7%) women. About 186(51.7%) women experienced dyspnea while climbing stairs, 138(38.3%) women experienced dyspnea while walking for more than 6 hours in a day, and 24 (6.7%) women experienced dyspnea while walking for less than 6 hours in a day. Intensity of breath difficulty showed that 158(43.9%) had mild, 136(37.8%) had moderate, and 66(18.3%) had severe difficulty in breathing. more than half of the women 196(54.4%) experienced chest tightness or pressure pain that improved with rest in 132(36.7%) women and pain-relieving medication in 186(51.7%) women, while 42(11.7%) required a hospital visit, as shown in Table IV.

The prevalence of oral manifestations in postmenopausal diabetic women revealed that red, swollen, and painful gums were observed in 100 (27.8%) women, dry mouth in 86 (23.9%), burning sensation in 92 (25.6%), and wounds healed longer after dental surgery in 122 (33.9%) women. Whereas sweet-smelling breath was observed in 186(51.7%) women. Dermatological manifestations in postmenopausal diabetic women revealed that dry, cracked skin was observed in 264(73.3%) women, 132(36.7%) had light brown scaly patches, and 134(37.2%) had yellowish reddish or brown patches on skin on skin, velvet like dark skin was observed in 190(52.8%) women. Moreover, hard, thickened skin was only noticed in 74(20.6%) women, whereas blisters were found in 50(13.9%) women, as shown in Table V.

The prevalence of gastrointestinal and psychological manifestations in postmenopausal diabetic women revealed that increased thirst and hunger were noticed in 162(45.0%) and 26(7.2%) respectively. The majority of women (336, or 93.3%) reported fatigue, and 200 women (55.6%) reported unexplained weight loss. 228 women (63.3%) reported appetite loss, which occurred suddenly in 134 women (37.2%) and more than one week later in 226 women (62.8%). In 110 (30.6%) of the women, the likelihood of infection and its severity increased. Delayed healing of wounds was noticed in 228(80.0%) women. Cold sweating occurred in 216 (60.0%) of the women, and 312 (86.7%) of the women felt tired on occasion. Mood swings were observed in 276(76.7%) women. Tingling or numbness 196(54.4%), swelling of hands or feet 264(73.3%), burning pain 264(73.3%), muscular pain 336(93.3%), too sensitive feet on touch 134(37.2%) were also noticed. About 228(63.3%) women had insomnia. Moreover, confusion or difficulty in concentration was detected in 126(35.0%) women. The symptoms became worse at night in 228(63.3%) women, as shown in Table VI.

Table I: Demographic characteristics of post-menopausal women with diabetes (n=360).

Variable	Mean±SD
Age (Years)	60.69±10.21
Weight (kg)	68.64±16.10
Height (Inch)	68.30±10.29
BMI (kg/m²)	24.22±8.42
Respiratory Rate (breath/min)	19.45±5.76
Temperature °F	77.64±22.36
Blood pressure (mmHg)	187.05±54.08
Heart rate beats/min	87.11±9.85
Random blood sugar (gm%)	284.83±92.13

Table II: Prevalence of comorbidities and socioeconomic status.

Variable		n	%
Socioeconomic Status	Low	110	30.6
	Middle	238	66.1
	High	12	3.3
History of Hypertension	Yes	312	86.7
	No	48	13.3
History of Dyslipidemia	Yes	276	76.7
	No	84	23.3
History of Depression	Yes	72	20.0
	No	288	80.0
Physical activity	Yes	222	61.7
	No	138	38.3

Table III: Prevalence of renal manifestations of postmenopausal diabetic women.

Variables		n	(%)
Frequent urination	Yes	74	20.6
	No	286	79.4
Urination at night	3 times at night	274	76.1
	at every two hour	86	23.9
	at every two hour	0	0.0
Color of urine	Light-colored urine	250	69.4
	Dark yellow urine	110	30.6
	Very dark or bloody urine	0	0.0
Poor BP control	Yes	248	68.9
	No	112	31.1

Table IV: Prevalence of ocular and respiratory manifestations of postmenopausal diabetic women.

Variable		n	%
Flashes	Yes	48	13.3
	No	312	86.7
Blind spots	Yes	96	26.7
	No	264	73.3
Distortion	Yes	116	32.2
	No	244	67.8

/Night blindness	Yes	98	27.2
	No	262	72.8
Dark spots in vision	Yes	142	39.4
	No	218	60.6
Near sightedness	Yes	186	51.7
	No	174	48.3
Visual Disturbances	Yes	192	53.3
	No	168	46.7
Blurry vision	Yes	156	43.3
	No	204	56.7
Vision loss	Yes	162	45.0
	No	198	55.0
Shortness of breath	Yes	276	76.7
	No	84	23.3
Dyspnea grading	While climbing stairs	186	51.7
	While walking for more than 6 hours in a day	138	38.3
	While walking for less than 6 hours in a day"	24	6.7
	While at rest	12	3.3
Severity of Dyspnea	Mild	158	43.9
	Moderate	136	37.8
	Severe	66	18.3
chest tightness	Yes	196	54.4
	No	164	45.6
Severity of chest pain	Improves with rest	132	36.7
	Need pain relieving medication"	186	51.7
	Requires hospital visit	42	11.7

Table V: Prevalence of oral and dermatological manifestations of postmenopausal diabetic women.

Variable		n	%
Red, swollen and painful gums	Yes	100	27.8
	No	260	72.2
Dry mouth	Yes	86	23.9
	No	274	76.1
Burning sensation in the mouth	Yes	92	25.6
	No	268	74.4
Any dental surgery that had taken longer to heal	Yes	122	33.9
	No	238	66.1
Sweet Smell breath	Yes	186	51.7
	No	174	48.3
Dry cracked skin	Yes	264	73.3
	No	96	26.7
Light brown scaly patches	Yes	132	36.7
	No	228	63.3
Yellow reddish or brown patches on skin	Yes	134	37.2
	No	226	62.8
Darker area of skin that feels like velvet	Yes	190	52.8
	No	170	47.2
Hard thickened skin	Yes	74	20.6
	No	286	79.4
Blisters	Yes	50	13.9
	No	310	86.1

Table VI: Prevalence of gastrointestinal and psychological manifestations of postmenopausal diabetic women.

Variable		n	%
Increased thirst	Yes	162	45.0
	No	198	55.0
Fatigue	Yes	336	93.3
	No	24	6.7
Increased hunger	Yes	26	7.2
	No	334	92.8
Unexplained weight loss	Yes	200	55.6
	No	160	44.4
Loss of appetite	Yes	228	63.3
	No	132	36.7
Duration of appetite loss	Suddenly	134	37.2
	More than one week	226	62.8
Increased incidence of infections	Yes	110	30.6
	No	250	69.4
Slow/delayed healing of wounds	Yes	288	80.0
	No	72	20.0
Cold sweating	Yes	216	60.0
	No	144	40.0
Feeling tired and weak occasionally	Yes	312	86.7
	No	48	13.3
Tingling or numbness in the hands or feet	Yes	196	54.4
	No	164	45.6
Irritability or mood swings	Yes	276	76.7
	No	84	23.3

Swelling of feet ankles hands or eyes	Yes	264	73.3
	No	96	26.7
Confusion or difficulty in concentration	Yes	126	35.0
	No	234	65.0
Burning pain in legs or feet	Yes	264	73.3
	No	96	26.7
Sensitive feet on touch	Yes	134	37.2
	No	226	62.8
Muscular pain or cramps in legs or feet	Yes	336	93.3
	No	24	6.7
Symptoms worsening at night	Yes	228	63.3
	No	132	36.7
Insomnia	Yes	228	63.3
	No	132	36.7

DISCUSSION

Type 2 diabetes, which is becoming more common and has many symptoms that may overlap with those reflecting the cessation of reproductive life, is poorly understood in terms of menopausal symptom patterns in women [23–25]. Therefore, the menopause history and symptoms experienced by type 2 diabetic women at a multi-center system were demonstrated in this study.

According to one study, women with diabetes had both natural and induced menopause during the same age and showed identical postmenopausal symptoms to their non-diabetic counterparts, despite having a higher BMI and increased disease related comorbidities. The most frequent postmenopausal complaints were aches in the muscles and joints, hot flashes, and difficulty sleeping [23], which is in line with findings from cohort studies of healthy, ethnically varied women [26,27]. The present study was in accordance with the above mentioned research and revealed that muscle and joint aches were reported in 336(93.3%), and sleeping disruption was experienced by 228(63.3%) women with a higher mean BMI $24.22 \pm 8.42 \text{ kg/m}^2$.

Similarly, one study found that the average age of menopause was 39 years for women who underwent induction of the menopause and 49 years for those who experienced it naturally [23], which is less than the average age of 51 years for women in North America [28]. These findings were inconsistent with the present study, which revealed that the mean age of women was 60.69 ± 10.21 years and their BMI was 24.22 ± 8.42 kg/m².

In comparison to cohort studies of healthy women, the prevalence rates of symptoms in another sample were greater. Around 69% of women reported having difficulty in sleeping [23], compared to rates of 43% to 50% in the other postmenopausal populations [29, 30]. In another study [31], rates of muscle and joint pain, hot flushes, and depressive symptoms were up to 79%, 75%, and 61%, respectively, as opposed to 55%, 49%, and 22% in the postmenopausal sample of the multiethnic Study of Women across the Nation (SWAN) [30, 31]. These findings showed similarity to the present study and indicated that the prevalence rate of symptoms was higher, muscular pain or cramps were observed in 336(93.3%) women, and most women 276(76.7%) had irritability or mood swings.

Besides diabetes, another study found that most common comorbidities were hypertension in 234(73%), osteoarthritis in 155(48%), and hyperlipidemia in 208(65%) postmenopausal women. In postmenopausal women with metabolic syndrome, increased incidence (more than 70%) of cognitive and urogenital symptoms were observed, whereas high prevalence (more than 80%) of loss of libido, muscle and joint rigidity, and neurological symptoms were reported [32]. These findings imply that the increased symptom reporting associated with menopause may be significantly influenced by coexisting, chronic illnesses. The present study supported the above reported research and revealed that, in addition to diabetes, most women had hypertension 312(86.7%), dyslipidemia 276(76.7%), and few reported depression 72(20.0%). Consequently, it was found that the presence of comorbidities raised the risk of T2DM in postmenopausal women. As far as the symptoms are concerned, most women showed high rates of genitourinary, ocular, respiratory, dermatological, and psychological manifestation reported in post-menopausal women.

It is expected that diabetic women with poorer glucose control have more severe anxiety and mood disturbances. Between 25% and 45% of diabetic individuals report depressed mood, and between 40% and 60% of diabetic people feel anxiety, 53 with women being more influenced than males [34, 35]. Anxiety and depression both have a link to having poor glycemic control

[34]. Even though the link between these symptoms and diabetes is well known, there aren't many research that particularly focus on diabetic midlife women or the postmenopausal period. [36]The present study revealed that irritability or mood swings were observed in most of the postmenopausal women 276(76.7%) with diabetes.

It can be challenging to separate the symptoms of diabetes from depression, which may be especially true in the post-menopausal situation. Examples of symptoms connected with these disorders include physical symptoms like tiredness, neurological complaints, and psychological concerns about mood swings. [23] The present study findings were consistent with the above mentioned research and indicated a high prevalence of fatigue, impaired concentration and psychological manifestations in postmenopausal women with diabetes.

The most common and severe aches described were those in the muscles and joints pain. About 20% to 80% of women report having musculoskeletal symptoms, which manifest differently during the menopausal transition [26,28,37]. Irrespective of ageing or fat, [26,37] a growing body of research from cross-sectional and longitudinal studies has shown a connection between menopause and symptoms of joint pain or stiffness [26]. Retrospective investigations of women who reported pain also show that backache and migraine headache persisted or dissipated throughout menopause, while osteoarticular pain and tension headache emerged or got worse [38]. As far as the present study is concerned, muscular pain and cramps, swelling, and burning pain were experienced by 336(93.3%), 264(73.3%), and 264(73.3%), respectively, and were associated with the menopausal state of women with diabetes. In contrast, there were no reports of headaches or back pain.

Additionally, a higher risk of osteoarthritis has consistently been linked to female gender, particularly around the age of 50. [39] Women were more likely than men to have symptomatic degenerative alterations of the knee and hand in the Framingham cohort [40]. In addition, postmenopausal women were shown to have more physical function restrictions than premenopausal SWAN participants, regardless of age, BMI, or depression symptoms [41]. The present study was consistent with the above cited results and indicated that degenerative changes reflected as swelling and painful joints were experienced in most of the post-menopausal women with diabetes. Besides, about 138(38.3%) were physically inactive.

Therefore, to clarify the role of age and hormonal changes in T2DM, future research may take into account increasing the sample size, enhancing the survey method, and maintaining

continuous follow-up of the female population before and after menopause. More longitudinal studies are also required to determine whether the risk variables for T2DM in premenopausal and postmenopausal females in the Pakistani community reflect a novel risk pattern.

CONCLUSION

This study concluded that fatigue, and muscular pain or cramps in legs or feet were the most prevalent symptoms, followed by visual disturbances, shortness of breath, chest tightness, dry and cracked skin, appetite loss, and slow or delayed healing of wounds in postmenopausal women with diabetes. Furthermore, the presence of comorbidities such as dyslipidemia and hypertension along with obesity increased the risk of diabetes in post-menopausal women. Therefore, it is advocated that giving diabetes-affected women therapies aimed at glucose control may improve their postmenopausal experience.

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