International Journal of Sciences & Applied Research

A comparative study of TSH and lipid profile in depressed postmenopausal women

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Abstract
Introduction: To explore the possibility that certain biochemical derangements like thyroid and lipid abnormalities may lead to occurrence of depression in subgroup of postmenopausal women, present study was planned to examine association of depression with TSH and lipid profile in post menopausal women (PMW).
Method: A cross sectional study was carried out at the out patient department of Gynecology and Psychiatry. Experimental group consisted of PMW with depression (ICD-10 criteria) (n=50), and was compared with a control group without depression. Subjects were assessed through Beck's depressive self rating inventory and their blood level of TSH and lipid Profile was assessed. Group comparison was done with chi square test and t test.
Result: Serum total cholesterol, triglyceride, TSH levels were significantly higher and HDL levels were significantly lower in the depressed group, while there was no statistically significant difference in LDL and VLDL levels between the groups.
Conclusion: Assessment of TSH and Lipid Profile can prove valuable in identification of postmenopausal women vulnerable to depression.

Introduction

Menopause, the cessation of ovulation generally occurs between 45-53 years of age. The hypoestrogenism that follows can lead to hot flashes, sleep disturbances, vaginal atrophy and dryness and cognitive and affective disturbances. More than 1 million women are expected to reach menopause each year. Many of whom experience physical and neuropsychiatry symptoms that may diminish their quality of life (Anderson E et al, 1987). Fifty percent of middle aged women experience a dramatic change in their emotion as well as change in physical states because of alteration in their hormone levels (Bobak et

al, 1990). The psychological symptoms such as depression, loneliness and despair usually persist even after cessation of hot flashes, fainting, headache, palpitation and insomnia (Kwon et al, 1996). Depression occurs about 2 times more frequently in women than in men (Kessler R C et al, 1994) and may increase during time of menopause (Archer J S, 1999).

High prevalence of depressive symptoms has been reported among postmenopausal women in the community (around 19%) (Lepine and Bouchez 1998). Depression not only makes a person feel physically ill but actually makes physical health worse and increases mortality. It affects functionality

among postmenopausal women (Alexpoulos et al, 2001).

There is an increasing incidence of subclinical and overt hypothyroidism and hyperthyroidism in postmenopausal women. These conditions can be associated with climacteric symptoms, cognitive impairment and subtle neuromuscular abnormalities. There is also an increase of LDL cholesterol and an increased risk for the development of arteriosclerosis and myocardial infarction (Schindler A E, 2003). Karen (Karen et al 1989), Suggested that natural menopause effect lipid metabolism unfavorably. Menopause, with its well-known hormonal profile, is associated with adverse metabolic changes, especially in plasma lipoprotein and cholesterol levels (Milan M T 2009). In postmenopausal women, total cholesterol, LDL cholesterol and triglyceride levels are increased and HDL cholesterol is decreased compared with premenopausal women of the same age and BMI (De Kleijn MJ et al 1996).

Several studies have investigated relationships of lipid levels with depressive or anxiety disorders (Olusi SO et al, 1996 & Huang TL, 2005). Possible explanations can be derived from several studies that showed how depression may have a biological link to low cholesterol by its association with altered central serotonergic functions (Engelberg H, 1992). On the other hand some studies also showed no such association (Mc Callum J, et al 1994), or yielded inconsistent results, (Lindberg G , et al 1994 & Markovitz GH et al , 1997).

Since not all women in menopause suffer from depression, in light of currently available data it is possible that certain biochemical derangements like thyroid and lipid abnormalities may lead to occurrence of depression in subgroup of postmenopausal women. So, present study was planned to examine association of depression with TSH and lipid profile in post menopausal women (PMW).

Methodology

A cross sectional study was carried out at the outpatient department of Gynecology and Psychiatry at SMS Medical College and Hospital, Jaipur.

Fifty consecutive postmenopausal patients with depression (age ranging from 45 to 60 years) diagnosed on the basis of ICD-10 research criteria were included in the experimental group. Diagnosed of depression was confirmed by two psychiatrists separately. The control group consisted of 50 non depressed PMW as per the selection criteria either who are accompanying patients and from the society. Subjects with significant physical or neurological illness, any evidence of comorbid psychiatric disorder other than depression and, prior history of psychiatric illness, having history of psychiatric illness in first degree relative, of history of receiving hormonal treatment were excluded from the study.

The informed consent was taken from all the study participants. In a calm and comforting environment the subjects were explained about purpose of the study and the nature of forthcoming procedure.

Each study subject was made available a self designed performa for general information and the investigator filled the sociodemographic data and clinical history in this performa, including details regarding the depressive illness and postmenopausal symptoms with duration.

The subjects were than administered the Hindi version of Beck's depressive self rating inventory for assessing and quantifying depression. This is a self reporting scale for quantification of depression. It contains 21-items score of 0-3 of which 15 items deal with psychological symptoms and only 6 are concerned with somatic ones (Beck et al 1961 ; Beck et al , 1974 ; Beck & Steer , 1984).

Blood sample of all the subjects were collected for testing TSH and lipid profile between 9:00 AM to 9:30 AM. After an

overnight fasting, 5 ml of venous blood sample was drawn from anticubital vein by using aseptic techniques in plain vial. Serum separated lipid profile (total cholesterol, serum triglycerides, HDL, LDL and VLDL) and TSH was assessed.

Above biochemical investigations were done with the aid of Auto analyzer [Selectra E and Micro Lab 300] , and Automated – immunoassay analyzer [Immulite 1000] , by using commercially available reagents and kits. The Procedure given in the manuals, accompanying the kits, were strictly followed. Method for cholesterol was enzymatic endpoint CHOD-POD Method(Naito H K,1984),for triglycerides method was enzymatic endpoint GPO-POD Method(Buccolo G et al,1973),for HDL method was Direct Liquid Enzymatic method(Naito H Ket al,1984),VLDL and LDL are calculated by Friedwalds formula, method for TSH was chemiluminescence immunoassay.

Statistical Analysis: chi – square test (χ^2) and Z test were used to compare both the groups. Results were considered significant when p-values were less than 0.05.

Results
In both the groups' majority of subjects were in age group of 45 to 50 years. Women in control group were younger though the difference was statistically insignificant. Majority of women were Muslim, urban, living in joint families & having monthly family income above Rs. 10000/-.

Women in experimental group were significantly more educated and also there were more separated women among the group (Table-1).

Among the depressed women 48% were mildly depressed, 34% were moderately depressed while 18% were severely depressed.

In Depressed group significantly higher proportion of women reported all postmenopausal symptoms except for sleep disturbances (Table-2).

TSH Level is significantly associated with depression in postmenopausal women (Table 3).

Serum total cholesterol, triglyceride, TSH levels were significantly higher and HDL levels were significantly lower in the depressed group, while LDL and VLDL levels were comparable in both the groups (Table 4).

Discussion
On an average prevalence of depression is shown to be around 12% among men and 24% among women i.e. prevalence of depression in women is twice as much as than men (Holland et al, 1991). Depression, one of the main health problems, is common among middle aged women who experience menopause. The main purpose of our study was to find out if there is any association of lipid profile and thyroid status with depression in menopausal women.

On the basis of age, religion, domicile, monthly family income, family type, and occupation both the groups are comparable. While there were significantly more educated and separated women in the experimental group. Marital status and education level showed significant association with depression.

A study by Lee (2003) found that in case of middle aged women, spouse acts as primary supporter and helps to overcome situation of emptiness after their child gets independent. In addition, a statistically significant negative correlation between depression and good relationship with spouse has been shown previously (Kim, 2000; Chang, 2000). The PMW depressed women experience more climacteric symptoms as compared to the non depressed PMW. Symptoms like episodes of hot flashes, night sweats, slowness, decreased libido, fatigue, reduction in self confidence, forgetfulness, sleep disturbances, urinogenital complaints, and mood changes were very significantly

Table 1: Comparison of sociodemographic characteristic of healthy postmenopausal women (Non depressed) and depressed postmenopausal women

Variables	Postmenopausal women		χ^2 (d.f.)	*P* Value
	Depressed Number (%)	Non Depressed Number (%)		
Age Group			2.983 (2)	> .05
45 – 50	16 (32)	23 (46)		
51 – 55	23 (46)	15 (30)		
56 – 60	11 (22)	12 (24)		
Religion			0.194 (2)	> .05
Hindu	17 (34)	15 (30)		
Muslim	28 (56)	30 (60)		
Others	5 (10)	5 (10)		
Marital Status			12.335 (1)	< .001
Widows/ Separated	20 (40)	4 (8)		
Living with spouse	30 (60)	46 (92)		
Education Status			14.817 (3)	< .005
Primary	5 (10)	20 (40)		
Middle	8 (16)	13 (26)		
High School	14 (28)	7 (14)		
College	23 (46)	10 (20)		
Domicile			1.000 (1)	> .05
Rural	12 (24)	8 (16)		
Urban	38 (76)	42 (84)		
Monthly Family Income (In Rs)			3.472 (1)	> .05
< 10000	5 (10)	12 (24)		
> 10000	45 (90)	38 (76)		
Family Type			0.370 (1)	> .05
Joint	36 (72)	37 (74)		
Nuclear	14 (28)	13 (26)		
Occupation			1.450 (1)	> .05
Housewife	26 (52)	20 (40)		
Service	24 (48)	30 (60)		

Table 2: Distribution of depressed & non depressed Postmenopausal women according to Symptom

Postmenopausal Symptom	Postmenopausal women		χ^2 (d.f.)	P-value
	Depressed	Non depressed		
	Number (%)	Number (%)		
Hot flashes	49 (98)	30 (60)	19.530 (1)	< .001
Night sweats	47 (94)	29 (58)	15.844 (1)	< .001
Slowness	46 (92)	26 (52)	17.907 (1)	< .001
Reduction in libido	46 (92)	35 (70)	6.498 (1)	< .01
Fatigue	43 (86)	28 (56)	10.928 (1)	< .001
Reduction in self confidence	42 (84)	11 (22)	11.310 (1)	< .001
Forgetfulness	41 (82)	31 (62)	4.960 (1)	< .05
Sleep disturbances or insomnia	37 (74)	34 (68)	0.437 (1)	> .05
Urinogenital complaints	36 (72)	15 (30)	17.647 (1)	< .001
Mood changes	32 (62)	11 (22)	17.993 (1)	< .001

Table 3: Distribution of depressed & non depressed Postmenopausal women according to TSH level

TSH Level	Postmenopausal women		X^2 (df)	P- Value
	Depressed Number (%)	Non Depressed Number (%)		
Normal (0.35- 4.00)	30 (60)	40 (80)		
Raised (> 4.00)	20 (40)	10 (20)	**4.761 (1)**	**< .05**

Table 4: Mean ± SD of Biochemical profile of depressed & non depressed Postmenopausal women

Variable	Mean ± SD		Z Value	P Value
	Depressed	Non Depressed		
Total cholesterol	175.1 ± 29.6	162.5 ± 21.8	2.423	< .05
Triglyceride	108.3 ± 31.8	97.3 ± 20.0	2.071	< .05
HDL	42.6 ± 8.10	46.90 ± 9.2	2.481	< .05
LDL	109.4 ± 29.7	103.3 ± 15.1	1.295	> .05
VLDL	21.66 ± 3.7	19.98 ± 6.7	1.774	> .05
TSH	3.90 ± 3.42	2.2 ± 2.33	2.956	< .01

higher in the depressed PMW as compared to the control group. Ellen (2006) found association of hot flushes, poor sleep, employment and marital status as significant risk factors for depression. Results of our study are similar to Haddin Joffe et al., (2003) they found that sleep disruption and depression are strongly associated with hot flushes in menopausal women.

Studies have also demonstrated that educational level and divorce are associated with depression (Sung 2000, Shin 2001).

Bromberger et al. (2007), concluded that the menopausal transition and postmenopausal years are accompanied by health problems, inadequate social support, marital / sexual issues and other stressful events (e.g. disease, death of a spouse, children leaving home) could increase the risk for depression. In the study group 40% were having raised TSH levels. In the control group 80% were normal thyroid functioning, while only 20% have raised TSH levels. There was statistically significant association between TSH levels and depression in Postmenopausal women. In a study Schindler found that even mild thyroid failure can have a number of clinical effects such as depression, memory loss, cognitive impairment and a variety of neuromuscular complaints.

Among lipids, total cholesterol, triglyceride and HDL shows significant association with depression, while there is no significant association between LDL, VLDL and depression in postmenopausal women. Schindler in his study found increased serum total cholesterol and low density lipoprotein cholesterol as well as reduced levels of high density lipoprotein as well as hypothyroidism. Therefore he recommended routine screening of thyroid function in the Alexopoulas G S, Kalz I R, Reynolds C F III, Carpenter D, Doherthy J P. The expert consensus guideline series: Pharmacotherapy of depressive disorders in older patients. Post graduate medicine special report.2001

climacteric period to determine subclinical thyroid.

In a study Stevenson et al. (1993) concluded that the menopause is associated with potentially adverse changes in lipids and lipoproteins, independent of any effects of ageing.

Maes et al. (1997) reported that changes in serum lipid comparison may be related to suicide, major depression and immune inflammatory responses. Their findings suggest that major depression is accompanied by reduced formation of cholesterylesters and perhaps by impairment of reverse cholesterol transport. The latter is reportedly accompanied by lower serum high density lipoprotein cholesterol (HDL – C). They concluded major depression is accompanied by lower serum HDL–C or by abnormal levels of serum total cholesterol, triglycerides, low density lipoprotein C.

Finding of our study is contrary to Ching Chih C et al., (2006), who reported that when Postmenopausal women were categorized into normal controls and those having anxiety disorders and depressive disorders, no significant differences were found in lipid concentrations of TG, TC, HDL, VLDL, LDL, TC/HDL, or LDL/HDL among the 3 groups.

Findings of our study indicate towards probability of an underlying biological disturbance among postmenopausal women with depression. It underlies that assessment of thyroid function & lipid profile may become important in early identification of this subgroup as well as identification of vulnerable population. Besides this a dietary manipulation and exercise may prove helpful in management of these patients.

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