Objective: Risk of depression is particularly high for women during the prenatal period. Various investigators have attempted to establish a link between thyroid function and postpartum depression. This study aimed to investigate whether thyroid function differs in women with postpartum depression compared to a control group.

Methods: In this case-control study, subjects were selected from Obstetrics & Gynecology and Psychiatric clinics of Kermanshah University of Medical Sciences. Forty-eight patients suffering from postpartum depression according to Diagnostic and Statistical Manual of Mental Disorders, fourth edition totally revised (DSM-IV-TR), and 65 normal controls underwent diagnostic evaluation by one trained psychiatrist using Structured Clinical Interview for DSM-IV-TR. Then, the demographic questionnaire and the Persian version of Edinburgh Postnatal Depression Scale (EPDS) were completed by the participants. Finally, their thyroid functions were assessed. Data analyses were done using the SPSS program.

Results: No statistically significant differences were observed between thyroid function tests and postpartum depression. According to multiple regression analysis with stepwise method, subjects with lower serum TSH, T3RU, T3 levels, younger age and longer period after delivery tended to have higher EPDS scores (P-value=0.008).

Conclusion: The present study reports that those women with postpartum depression had no greater prevalence of thyroid dysfunction than the control subjects. It seems that thyroid dysfunction should be considered in women with postpartum depression individually, but the role of thyroid as an important cause of this condition is not yet established. This suggests that future studies should concentrate on this concept in postpartum depression.

Keywords: Postpartum depression, Postpartum period, Thyroid hormone.
Materials and Method

We conducted a case-control study to assess thyroid function in postpartum depression. Forty eight patients suffering from postpartum depression according to DSM-IV-TR, and sixty five normal controls entered the study. Subjects were selected from Obstetrics & Gynecology and Psychiatric clinics of Kermanshah University of Medical Sciences from November 2010 to may 2011. Patients and controls were free of any medication and were physically healthy with no previous history of thyroid & mental disorders according to past medical history. Subjects were eligible if they were in 30-90 days after delivery. The written informed consent was obtained from each subject, and they underwent diagnostic evaluation by one trained psychiatrist using Structured Clinical Interview for DSM-IV-TR ; then they completed the demographic questionnaire and the Persian version of Edinburgh Postnatal Depression Scale (EPDS). Finally their thyroid functions were assessed.

The Edinburgh Postnatal Depression Scale is a 10-item self-report scale, specifically designed to screen for postpartum depression in community samples (17). Each item is scored on a 4-point scale (0-3), the minimum and maximum total score ranging from 0 to 30, respectively. The EPDS has been translated into Persian and validated in Iranian people (18). The EPDS cannot confirm a diagnosis of depressive illness, but when selecting this threshold, the sensitivity for the detection of major depression was almost 100% and the specificity was 82%.33. The EPDS is easy to administer, takes only a few minutes to complete, and is well accepted by the women and the staff.

T3 was assessed by Radio Immuno Assay (RIA) kit . Normal values are 1.25-2.50 nmol/L. T4 was assessed by Radio Immuno Assay (RIA) kit . Normal values are 65-138 nmol/L. The Thyroid Stimulation Hormone (TSH) was assessed by Radio Immuno Assay (RIA). Normal values are 0.36–3.98 mIU/L. T3 hormone (TSH) was assessed by Radio Immuno Assay kit . Normal values are 65-138 nmol/L. The Thyroid Stimulation Hormone (TSH) was assessed by Radio Immuno Assay (RIA). Normal values are 1.25 -2.50 nmol/L. T4 was assessed by Radio Immuno Assay kit . Normal values are 30 -40%. Normal values of FTI are 5 -11. All analyses were done using the SPSS program 13. Statistical significance was defined as two-sided P values using a significance level of 0.05. Differences were tested with Student t-test for normally distributed continuous variables. Chi square tests were used for categorical variables. Multiple regression with stepwise method was used when multiple variables were considered simultaneously.

Results

In this study, 185 women were selected from Gynecology& Obstetric and Psychiatric clinics in their postpartum period and were assessed with Structured Clinical Interview for DSM-IV-TR, the demographic questionnaire and EPDS. Of them, 72 refused to participate in thyroid function testing.

### Table 1. The results of thyroid function in postpartum depression and control group

| Variables                  | Postpartum depression | Mean   | t-test p-value |
|----------------------------|-----------------------|--------|---------------|
| T3 RIA nmol/lit            | yes                   | 1.73   | 0.19          |
|                           | no                    | 1.78   |               |
| T4 RIA nmol/lit            | yes                   | 93.71  | 0.24          |
|                           | no                    | 90.31  |               |
| TSH IRMA mlU/lit           | yes                   | 2.33   | 0.16          |
|                           | no                    | 2.69   |               |
| T3RU RIA %                 | yes                   | 33.43  | 0.18          |
|                           | no                    | 34.07  |               |
| FTI                       | yes                   | 7.17   | 0.53          |
|                           | no                    | 6.99   |               |

### Table 2. Postpartum Depression by Subjects Characteristic: Results of χ² Test Analysis

| Variables                  | Number | Postpartum depression | P-value |
|----------------------------|--------|-----------------------|---------|
| Thyroid function           |        |                       |         |
| Euthyroid                  | 113    | yes 48 %              | 0.97    |
| Hypothyroid                | 90     | yes 38% (79.2%)       |         |
| Subclinical hypothyroid    | 5      | no 2% (4.4%)          |         |
| Parity                     |        |                       |         |
| One                        | 113    | yes 3%                | 0.005   |
| Two                        | 47     | yes 20% (41.7%)       |         |
| Three                      | 26     | yes 18% (37.5%)       |         |
| Four and more              | 30     | yes 8% (16.7%)        |         |
| Infant feeding             |        |                       |         |
| Breast feeding             | 113    | yes 4%                | 0.43    |
| feeding                    | 77     | no 30% (62.5%)        |         |
| Formula                    | 18     | yes 10% (15.4%)       |         |
| Both                       | 18     | no 8% (12.3%)         |         |
| Occupation                 |        |                       |         |
| Housewife                  | 113    | yes 48 %              | 0.97    |
| Others                     | 14     | no 6% (12.5%)         |         |
| Education                  |        |                       |         |
| Elementary school          | 113    | yes 48 %              | 0.65    |
| High school Academic       | 57     | yes 26% (54.2%)       |         |
| Type of delivery           |        |                       |         |
| Natural delivery           | 45     | yes 22% (46.2%)       | 0.26    |
| Cesarean                   | 68     | no 26% (54.2%)        |         |
| Desired Pregnancy          |        |                       |         |
| Yes                       | 85     | yes 32% (66.6%)       | 0.07    |
| No                        | 28     | no 16% (33.3%)        |         |
| Child gender               |        |                       |         |
| Male                      | 51     | yes 18% (37.5%)       | 0.16    |
| Female                     | 62     | no 30% (62.5%)        |         |
| Postpartum hemorrhage      |        |                       |         |
| Yes                       | 8      | yes 6% (12.5%)        | 0.054   |
| No                        | 105    | no 42% (87.5%)        |         |

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Of the other 113 subjects, 48 were in depression group and 65 in control group. Participants in this study had an age range of 19 to 41 years with a mean of 26.88 and 29.12 years in case and control group respectively (P-value <0.05). EPDS scores ranged from 1 to 12 in case and 14 to 30 in control group with a mean of 6.34 & 21.02 respectively (P-value <0.05). No statistically significant differences were observed between thyroid function tests and postpartum depression (Table 1). In addition, no correlation was found between postpartum depression and thyroid dysfunction.

According to chi square test analysis of subjects’ characteristics (Table 2), only parity had significant relation with postpartum depression (P-value <0.05). According to multiple regression analysis with stepwise method, subjects with lower serum TSH, T3RU, T3 levels, younger age and longer period after delivery tended to have higher EPDS scores (P-value=0.008). The correlation co-efficient (r) was 0.58. The co-efficient of determination, r², was 0.34. In other words, about 34% of the variability of EPDS scores is associated with these variables.

Discussion

In our study, information regarding a wide range of potential risk factors was collected. Younger age and parity were two risk factors which had significant relation with postpartum depression (PPD). Studies looking at the possible effect of number of parities on PPD are controversial. One study reported no difference in PPD between primipara and multipara women, but reported a two-fold increase in the incidence of postpartum psychosis, with no age correlation (19). Some studies have shown a possible association between the first childbirth and PPD (20) and others did not find an association between the number of deliveries and PPD (21). According to our results other demographic and obstetric factors had no significant relationship with postpartum depression. However, a potential weakness of this study might be a smaller sample size compared to other epidemiological studies.

The present study reports that those women with postpartum depression had a no greater prevalence of thyroid dysfunction than control subjects, and mean thyroid function indexes (T4, T3, TSH, T3RU, FT1 levels) had no significant differences between two groups. There are several papers suggesting that the thyroid function of depressed patients is within the normal range (22-27).

On the other hand, some studies showed a relation between thyroid dysfunction and postpartum depression. Thyroid antibody-positive women are prone to hypothyroidism, which is often preceded by transient hyperthyroidism after delivery (28). In addition, lower range total and free thyroxine concentrations during late pregnancy may be related to postpartum depressive symptoms (29). The presence of abnormal thyroid function tests is not related with a distinct clinical picture (30). However, again, the literature is split and the results are inconclusive (31-33).

Our findings showed that T3, TSH and T3RU levels correlated negatively with EPDS scores. One study suggests that women with T4 and FT4 in the lower euthyroid range and higher T3RU had higher EPDS ratings (34); another study suggests that subjects with higher serum TSH tended to have higher EPDS scores (35).

Overall, the review of the literature suggests that there are no conclusive data on the role of thyroid function in postpartum depression. It seems that thyroid dysfunction should be considered in women with postpartum depression individually, but the role of thyroid as an important cause of this condition is not yet established.

The main limitations of this study are the small sample size and lack of thyroid autoimmune assessment. We suggest that studies with larger sample sizes be conducted to further evaluate thyroid autoimmune tests to clarify the role of thyroid function in postpartum depression.

References

1. Berga SL, Parry BL. Special Areas of Interest, Psychiatry and Reproductive Medicine. In: Sadock BJ, Sadock VA, Ruiz P, Kaplan HI, eds. Kaplan and Sadock's comprehensive textbook of psychiatry, 9th ed. Philadelphia: Lippincott Williams & Wilkins; 2009.

2. Sadock BJ, Kaplan HI, Sadock VA. Kaplan & Sadock's synopsis of psychiatry: behavioral sciences/clinical psychiatry, 10th ed. Philadelphia: Lippincott Williams & Wilkins; 2007.

3. Kendall RE, Chalmers JC, Platz C. Epidemiology of puerperal psychoses. Br J Psychiatry 1987; 150: 662-673.

4. Weissman MM, Offison M. Depression in women: Implications for health care research. Science 1995;269: 799–801.

5. Cogill SR, Caplan HL, Andera H, Robson KM, Kumar R. Impact of maternal postnatal depression on cognitive development of young children. Br Med J (Clin Res Ed) 1986; 292: 1165-1167.

6. Harp D, Hay DF, Pawlsby S, Schmucker G, Allen H, Kumar R. The impact of postnatal depression on boys’ intellectual development. J Child Psychol Psychiatry 1995; 36: 1315-1336.

7. agedahl-Strindlund M. Children of mentally ill mothers: mental development, somatic growth and social outcome. Scand J Soc Med 1988; 16: 121-127.

8. Harris B. Biological and hormonal aspects of postpartum depressed mood. Br J Psychiatry 1994; 164: 288-292.

9. Llewellyn AM, Stowe ZN and Nemeroff CB. Depression during pregnancy and the

Iranian J Psychiatry 6:3, Summer 2011

Published by "Tehran University of Medical Sciences" (www.tums.ac.ir)
1. Josefsson A, Angelsioo L, Berg G, Ekstrom CM, Gunnervik C, Nordin C, et al. Obstetric, somatic, and demographic risk factors for postpartum depressive symptoms. Obstet Gynecol 2002; 99: 223-228.

2. Glinoer D. The regulation of thyroid function in pregnancy: pathways of endocrine adaptation from physiology to pathology. Endocr Rev 1997; 18: 404-433.

3. Harris B, Fung H, Johns S, Kologlu M, Bhatti R, McGregor AM, et al. Transient post-partum thyroid dysfunction and postnatal depression. J Affect Disord 1989; 17: 243-249.

4. Pop VJ, de Rooy HA, Vader HL, van der Heide D, van Son M, Kompoe IH, et al. Postpartum thyroid dysfunction and depression in an unselected population. N Engl J Med 1991; 324: 1816-1818.

5. Hendrick V, Altshuler LL, Suri R. Hormonal changes in the postpartum and implications for postpartum depression. Psychosomatics 1998; 39: 93-101.

6. MacCrimmon DJ, Wallace JE, Goldberg WM, Streiner DL. Emotional disturbance and cognitive deficits in hyperthyroidism. Psychosom Med 1979; 41: 331-340.

7. Kirkegaard C, Faber J. The role of thyroid hormones in depression. Eur J Endocrinol 1998; 138: 1-9.

8. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry 1987; 150: 782-786.

9. Montazeri A, Torkani B, Omidvare S. The Edinburgh Postnatal Depression Scale (EPDS): translation and validation study of the Iranian version. BMC Psychiatry 2007; 7: 11.

10. Kendell RE. Emotional, physical factors in the genesis of puerperal mental disorders. J Psychosom Res 1985; 29: 3-11.

11. Tamaki R, Murata M, Okano T. Risk factors for postpartum depression in Japan. Psychiatry Clin Neurosci 1997; 51: 93-98.

12. Posner NA, Unterman RR, Williams KN, Williams GH. Screening for postpartum depression. An antepartum questionnaire. J Reprod Med 1997; 42: 207-215.

13. Fava M, Labbate LA, Abraham ME and Rosenbaum JF. Hypothyroidism and hyperthyroidism in major depression revisited. J Clin Psychiatry 1995; 56: 186-192.

14. Joffe R, Segal Z and Singer W. Change in thyroid hormone levels following response to cognitive therapy for major depression. Am J Psychiatry 1996; 153: 411-413.

15. Haggerty JJ, Jr., Silva SG, Marquardt M, Mason GA, Chang HY, Evans DL, et al. Prevalence of antithyroid antibodies in mood disorders. Depress Anxiety 1997; 5: 91-96.

16. Pop VJ, Maertens LH, Leusink G, van Son MJ, Knottenherus AA, Ward AM, et al. Are autoimmune thyroid dysfunctions and depression related? J Clin Endocrinol Metab 1998; 83: 3194-3197.