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(RESEARCH ARTICLE)

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Past abortions as a risk factor of hypothyroidism in women working as nurses in a tertiary care hospital in northern India

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Abstract

Aim: To study past abortions as a causative factor for hypothyroidism in nurses working at IGMC Shimla.

Methods: This retrospective cohort targeted IGMC hospital nursing staff with completed family who were approached individually and asked to fill a preformed questionnaire after informed consent. The study was conducted between January 2021 and December 2021. Women who had previous thyroid surgery/radioiodine treatment or hypothyroidism before or within one year of marriage were excluded. The association between past abortions and hypothyroidism was then studied.

Results: We enrolled 178 married nurses in our study with a mean age of 46+/- 16.3 years. The mean BMI of the nurses under study was 24.80±3.822 kilogram/metre^2. 77 women (46%) in our study population had a history of abortion with abortions constituting 53% of total pregnancies. From the study it was found that there was a significant association between abortion and subsequent hypothyroidism (Relative Risk: 1.9444, p value of 0.0331).

Conclusion: There was a significant association of past abortion with subsequent hypothyroidism.

Keywords: Abortion; Hypothyroidism; Microchimerism; Thyroid

1. Introduction

The thyroid gland is a midline structure located in the anterior neck functioning as an endocrine gland responsible for production of thyroid hormone and calcitonin, thus contributing to the regulation of metabolism, growth, and serum concentrations of electrolytes such as calcium.[1] Many disease processes can involve the thyroid gland, and alterations in the production of hormones can result in hypothyroidism or hyperthyroidism. The thyroid gland is involved in inflammatory processes (e.g., thyroiditis), autoimmune processes (e.g., Graves' disease), and cancers (e.g., papillary thyroid carcinoma, medullary thyroid carcinoma, and follicular carcinoma).

The relationship between pregnancy and autoimmune thyroid disease (AITD) has been well documented with exacerbation of preexisting AITD or initiation of AITD common postpartum.[2] Increased titres of thyroid autoantibodies, a reversed ratio of CD4+/CD8+ T cells, and a change in cytokine profiles to favour type1 T helper (Th1) responses have all been observed in the postpartum. In AITD, Graves' disease has been shown to be most markedly suppressed by pregnancy itself, but up to 60% of Graves' disease patients of childbearing age have been reported to develop this disease within 1 yr of delivery.[3] In addition, postpartum thyroiditis has been found in approximately 8–10% of all women and increases to more than 40% in women with TPO autoantibodies. In general, this increased

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incidence of AITD in the postpartum has been attributed to altered immunity during and after pregnancy, but the precise mechanism(s) have not been fully elucidated.

AITD has also been shown to be one of the risk factors contributing to spontaneous abortion. Untreated thyroid dysfunction, hyperthyroidism, and hypothyroidism due to AITD may also influence pregnancy outcome. Even the presence of thyroid antibodies against Tg and/or TPO without evidence of thyroid dysfunction has been repeatedly recognized as a risk factor for miscarriage.[4],[5] The precise mechanisms that may explain this phenomenon are unclear, but three hypotheses have been proposed. 1) Pregnancy loss seen in patients with thyroid antibodies may be due to subtle deficiency of thyroid hormone. 2) There may be a direct effect(s) of thyroid antibodies, for example on the placenta. 3) Thyroid antibodies may just represent an abnormal immune state responsible for an unstable implant.

Pregnancy can cause transplacental bi-directional cell trafficking between mother and fetus also known as microchimerism. Many authors have suggested a close relationship linking this exchange with the development of future autoimmune diseases in females. Early terminations from surgical abortion can deliver up to 500,000 nucleated fetal cells into a woman's circulation.[6] Male fetal cells appear to have increased antigenicity in females. During pregnancy, a woman confronts an immunological challenge, because the fetus carries paternal genes, some of which are expressed on the cell surface and may provoke potent allogeneic responses. Yet, in spite of these immunologic cell differences, rejection of the fetus does not frequently occur.[7] Examples of autoimmune diseases where fetal Y-chromosomes were detected decades after pregnancy in mother's blood are progressive systemic sclerosis, hashimoto's thyroiditis, systemic lupus erythematosus and sjogren syndrome. In our study, we strive to establish the relationship between past abortions and future thyroid disease by comparing the incidence of hypothyroidism in nurses of IGMC Shimla with and without history of abortions in the past.

2. Material and methods

The present study was a retrospective cohort study done on 178 nurses from 1st January 2021 through 31st December 2021. A written informed consent was obtained from all subjects involved in the study ensuring their acceptance in the study. Nurses with completed family and working in one IGMC Shimla Himachal Pradesh and consenting to participate in the study were included in this study. A history of previous thyroid surgery/radioiodine treatment or diagnosis of hypothyroidism established before or within 1 year of marriage would exclude a subject from the study. Development of Hypothyroidism at least 1 year after the marriage was set as our primary outcome. The results were calculated and analyzed statistically using IBM SPSS for Windows, version 23 (IBM Corporation, Armonk, NY, USA) with descriptive statistics such as frequencies, percentages, means, and standard deviation (SD) used to represent the categorical data.

3. Results

Over a period of one year,178 nurses who were married and had completed their family and are presently working in IGMC Shimla were studied. The age group varied from 27 years to 86 years (mean age 46+/- 16.3 years) with age of marriage ranging from 17years to 42 years (mean 27.2+/- 7.4 years). Mean BMI of our study population was 24.80+/- 6.64 kg/m2. The number of pregnancies ranged from zero to a maximum of eight children with most nurses having two children (38.8%) [figure no. 1].

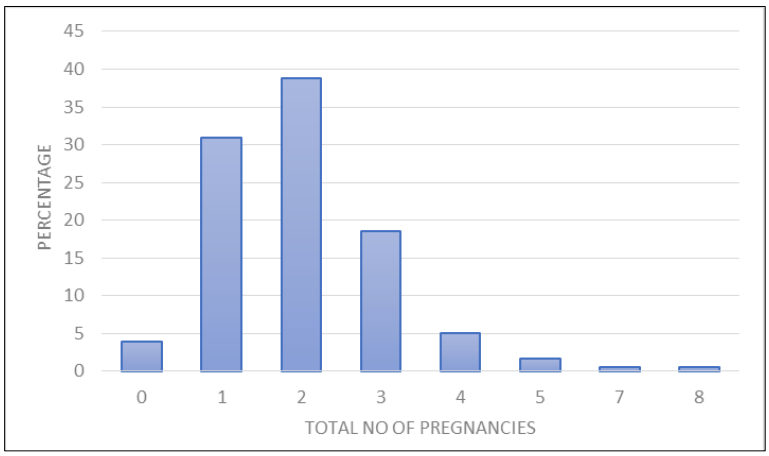

Figure 1 The number of pregnancies in the subjects of our study group

Of the 178 nurses, 101 (56.7%) had no abortion, 51(28.7%) had 1 abortion, 19 (10.7%) had 2 abortions, 5(2.85%) had 3 abortions, 1(0.6%) had 4 abortions and 1(0.6%) had 6 abortions. (Figure 2) 42 females in the study (23.6%) had hypothyroidism and rest 136 (76.4%) had no hypothyroidism with the mean age of diagnosis of hypothyroidism being 38.29+/-15.88 years.

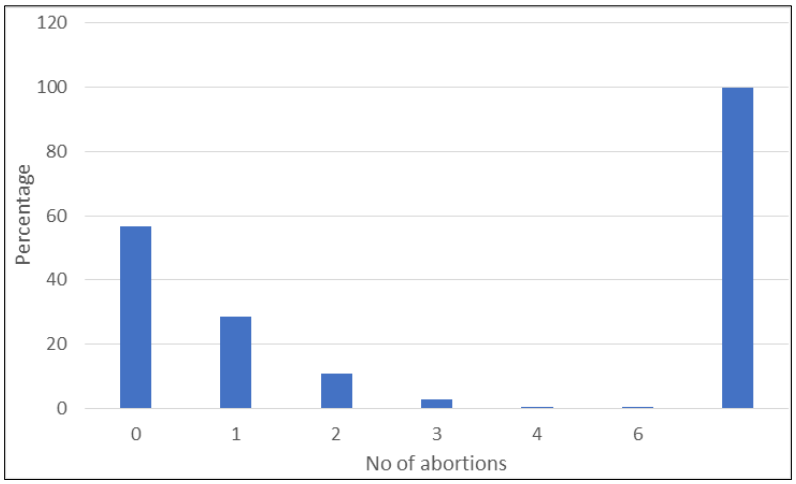

Figure 2 Number of abortions per female in our study

Of the 178 nurses enrolled in the study, 8 nurses later rechecked and discovered that they had developed hypothyroidism before marriage or in the same year of marriage, hence were excluded from analysis thereby decreasing the total number of eligible nurses who had hypothyroidism to 34, out of which 14 had no history of abortion and 20 had history of abortion in past, vice versa, out of total 72 patients out of 170 with history of abortions, 20 developed hypothyroidism and 52 had no hypothyroidism. The relative risk of developing hypothyroidism with history of abortion in past was found to be 1.9444 with confidence interval of 1.0549 to 3.5840 with P value of 0.0331. After applying Logistic Regression to this data with Hypothyroidism being the dependent variable and Age, Age at Marriage, BMI, History of Abortions and Parity being the predictor variables none of the variables were seen to have significant association with development of Hypothyroidism except Abortions **(p= 0.032).** (tables 1-3)

Table 1 Relationship between abortion and hypothyroidism in our study

		Hypothyroidism		Total
		Present	**Absent**	
Abortion	Present	14	84	98
	Absent	20	52	72
Total		34	136	170

Table 2 Analysis of the relationship between abortion and hypothyroidism

Relative Risk	**1.9444**
95% CI	1.0549 to 3.5840
Z statistic	2.131
Significance level	P = 0.0331
NNT(Harm)	7.412

Table 3 Logistic regression of our data

	B	Standard Error	Wald	Degree of freedom	Significance	Exp(B)
Abortion	0.836	0.391	4.584	1	0.032	2.308
Constant	-1.792	0.289	38.525	1	0.000	0.167

B: Unstandardized coefficient, Exp(B): odds ratio

4. Discussion

This study aimed to learn about the association of past abortions with the risk of future hypothyroidism in females. In the study, we observed that the 178 women, working as nurses in IGMC, had an average age of marriage of 27.2+/-16.3 years. The mean BMI of the nurses we studied was 24.80+/-7.64 kg/m2 which was comparable to average BMI of 22.46+/-4.89 in non-smoking females of Delhi as studied by Chhabra et al. [8] The average number of pregnancies per female in our study was 2 however the number of viable children per women was only 1.37 which was less than the Indian total fertility rate of 2 according to national family health survey-5 conducted between 2019-2021. [9]

77 women (46%) in our study population had a history of abortion with abortions constituting 53% of total pregnancies. This was way more than average Indian population in whom abortions constituted only 2.9% of pregnancies.[10] Of the 178 nurses studied, 42 (23.6%) were hypothyroid and the mean age of diagnosed hypothyroidism was 38.29+/- 15.8y. This was in line with the 20.9% incidence of hypothyroidism in females as observed by Kumar et al in Jharkhand, India [11] and more than the 15.86% incidence in females seen in eight cities of India by Unnikrishnan et al. [12]

Total number of nurses in our study who had hypothyroidism after completing 1 year of marriage were 34, out of which 14 had no history of abortion and 20 had history of abortion in past while out of the total 72 patients with history of abortions 20 developed hypothyroidism and 52 had no hypothyroidism.

In our study, there was no significant relationship between increasing BMI and hypothyroidism. Rong-hua Song et al conducted studies comparing the risk of thyroid disorders of obese patients, which showed that obesity was significantly associated with increased risks of hypothyroidism, including overt hypothyroidism and subclinical hypothyroidism (RR = 1.86, 95% CI 1.63–2.11, P < 0.001) [13]. A retrospective, observational study was also conducted in the Department of Endocrinology and Obesity Clinic, Medwin Hospital, Hyderabad, India in Mar 2008 by Verma et al between September 2006 and February 2008, which showed that obesity was higher (46% versus 34%) in overt hypothyroidism than in subclinical hypothyroidism (p=0.21) and more patients were overweight in overt hypothyroidism group than in subclinical hypothyroidism group (p=0.02). [14]

In our study, parity was not significantly related to hypothyroidism. Walsh et al in his study, concluded that parity is not a risk factor for thyroid autoimmunity or thyroid dysfunction. Analysis using number of live births gave similar results. The results were similar in younger and older women.[15] Nele Friedrich et al on the contrary concluded that parity appears to be a potential risk factor for AIT.[16]

The relative risk (RR) of developing hypothyroidism in future with history of abortion in past as seen in our study was 1.9444 with confidence interval of 1.0549 to 3.5840 with a significant P value of 0.0331. A similar study was conducted by Chauhan et al which suggests that abortion (elective or therapeutic) in the past is strongly associated with newly diagnosed hypothyroidism in females aged 42.2 ± 9.8 years; OR: 23.5 (P < 0.0001).[17]

5. Conclusion

In the females with history of abortion in past there was increased risk of hypothyroidism hence routine screening of such patients for hypothyroidism may be performed leading to early diagnosis and treatment.

Limitations

This observational cohort study was conducted in a single centre over a period of 1 year only. The potential factors causing hypothyroidism including family history, past history of infectious thyroiditis or drug intake etc., were not studied in detail

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

The study was approved by the Institutional Ethics Committee (ECR/533/Inst/HP/2014/RR-20).

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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