DIABETES MELLITUS & THYROID DYSFUNCTION IN VITILIGO OF TERAI REGIONS OF NEPAL

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ABSTRACT

INTRODUCTION

Vitiligo is common acquired disease. Clinically it present with depigmented, macules and patches. Vitiligo has been shown association with many autoimmune diseases like Diabetes mellitus, Thyroid disorders, Graves disease, Pernicious anemia, etc. This study was undertaken to assess the prevalence and association of diabetes mellitus and thyroid dysfunction in vitiligo patient.

MATERIAL AND METHODS

This study was a case control study carried out in Dermatology Department, Universal College of Medical Sciences – Teaching Hospital (UCMS-TH) from Dec 2022 to Nov 2023. 70 cases of Vitiligo and 70 controls with same sex, ages and gender matched were enrolled. All patients in both the group, we performed thyroid function test and fasting blood sugar.

RESULTS

Out of 70 cases, 6 (8.6%) people has impaired FBS and 6 (8.6%) people have high T3& T4 and 10 (14.3%) people have high TSH whereas 3 (4.3%) people have low T3 & T4 and 4 (5.7%) people have low TSH. Association with different age group in both case and control group with fasting blood sugar and thyroid function test was seen which was statistically not significant.

CONCLUSION

There were impaired fasting blood sugar and abnormal thyroid dysfunction in many cases. Therefore vitiligo patient needs to undergo thyroid function test and blood sugar level to prevent the complication.

KEYWORDS

Vitiligo, Thyroid Dysfunction, Diabetes Mellitus

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https://doi.org/10.3126/jucms.v11i03.61476

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INTRODUCTION

Vitiligo is a common acquired disorder affecting 1-2 % of general population.[1,2] It is characterized by well-defined depigmentary patches, often symmetrically distributed. Along with skin, hair may or may not be affected.[3]

The exact cause of vitiligo is unknown. Several hypotheses are predicted. Among the studies, the autoimmune, neural and self-destructive or free radical hypothesis mechanisms are involved in pathogenesis.[4-6] Other newer hypothesis are antioxidant deficiency hypothesis, apoptosis of melanocytes.

The autoimmune hypothesis proposes that immune system dysfunction results in destruction of melanocytes.[7] This hypothesis is supported by the frequent association of vitiligo with several systemic autoimmune disease like thyroid disease (Hypothyroidism, Hyperthyroidism, Hashimoto thyroiditis, Graves disease), Diabetes mellitus, Pernicious anemia, Addison's disease etc.[8]

The prevalence of thyroid disease in vitiligo patients is reported to be from 0.01% to 0.06%.[9] Vitiligo can be connected with increase activity of thyroid gland with distinct rise in basal metabolism.[10]

Diabetes mellitus is one of the common chronic disease due to impaired ability to process glucose. Diabetes mellitus is another autoimmune disease that has shown correlation with vitiligo. T-cell destruction[11] and oxidative stress has been thought to be believed in pathogenic mechanism of both vitiligo and Diabetes mellitus.

In Nepal not many studies have been done on the association of vitiligo with thyroid and Diabetes mellitus. Therefore, we have undertaken to see associations of thyroid disease in vitiligo patient and Diabetes mellitus also correlation of the disease activity. Also, vitiligo can be the mirror for systemic disease. So this can help in early detection of thyroid disease and Diabetes mellitus reducing the comorbidities and complications in patients.

MATERIAL AND METHODS

A case control study was conducted in UCMS-TH from December 2022 to November 2023. 70 case and controls were enrolled in the study. Ethical clearance (no. UCMS/IRC/224/22) was taken from institutional ethical committee.

Sample size calculation was done by using the following formula

$$n = \left(\frac{r+1}{r}\right)(Z_\alpha + Z_\beta)^2 \bar{p}(1-\bar{p}) \Big/ (p_1 - p_2)^2$$

r = ratio of case to control = 1
z_α = level of significance at 5%= 1.96
z_β = power of test at 80% = 0.84
From the previous study[12]
p_1 = prevalence of thyroid dysfunction in case group = 29.8% = 0.298
p_2 = prevalence of thyroid dysfunction in control group = 10% = 0.1
$\bar{p} = \frac{p_1 + p_2}{2} = 0.199$

So with the help of above formula Sample size (n) was 63.75. We took 70 case and 70 control in our study.

Patients attending UCMS-TH OPD in department of dermatology who were clinically diagnosed with vitiligo were included for cases. 70 age and sex matched non-vitiligo cases, presenting with other common dermatological conditions were included as controls. Written consent was taken for all the case and control. A thorough history and examination was done in each patient with the help of standard proforma. Vitiligo patient was classified as localized and generalized. Focal and segmental was under localized whereas acrofacial and vitiligo vulgaris was in generalized vitiligo.

For fasting blood sugar, patients were instructed to fast overnight and instructed to visit next day for blood sample. 3 ml blood sample was taken. Diabetes was diagnosed if fasting blood sugar will be >126mg/dl (7.0mmol/l).[13]

Thyroid function test was assayed using radio immune assay technique. 5 ml blood was taken for T3, T4 and TSH. For thyroid function test, ranges value was T3 (2-4.2pg/ml), T4 (8.9-17.2 pg/ml) and TSH (0.4-4.5µLu/ml). Symptoms for thyroid dysfunction and diabetes were asked. Thyroid gland was palpated if needed.

Data analysis was done in SPSS software (version 20). P value less than 0.05 was considered statistically significant.

RESULTS

In our study, 70 cases patients were enrolled in which 23(32.85%) were male and 47 (67.14%) were female. Out of 70 control, 22 were male and 48 were female. The number of cases with abnormal blood sugar was 6 (8.6%) whereas it was 5 (7.1%) in control (Table 1).

Table 1. Prevalence of diabetes mellitus in case and control group

Prevalence of Diabetes Mellitus	Frequency	Percentage
Control	5	7.1
Case	6	8.6

Total 17 (24.3%)cases and 30 (42.9%) control shows high T3,T4 & TSH ,15 (21.4%) cases and 13 (18.6%) control were seen with low T3,T4 &TSH (Table 2).

Table 2. Prevalence of thyroid dysfunction in case and control group

Group		Low	Normal	High
T3	Control	3 (4.3)	61 (87.1)	6 (8.6)
	Case	4 (5.7)	63 (90)	3 (4.3)
T4	Control	3 (4.3)	61 (87.1)	6 (8.6)
	Case	7 (10)	59 (84.3)	4 (5.7)
TSH	Control	7 (10)	45 (64.3)	18 (25.7)
	Case	4 (5.7)	56 (80)	10 (14.3)

Among the cases, high T3 & T4 was seen in between 10 to 30 years (6.9%). TSH was high in age group of 31 to 50 years (20%). (Table 3) In control, high TSH was observed in > 70 years (8.57%) and high T3 & T4 observed in between 10 to 30 years (10.26%) as in cases. The high T3, T4, TSH

was observed more in female that is 11 out of 17. Similar data observed in control. Out of 30 high T3, T4 &TSH, 21 was female. The association of age group and thyroid function test was not statistically significant.

Table 3. Association between age group and thyroid dysfunction

		Age group (years)	Low	Normal	High	P value
		<10	3 (17.65)	13 (76.47)	1 (5.88)	
		10-30	0 (0)	35 (89.74)	4 (10.26)	
		31-50	0 (0)	10 (90.91)	1 (9.09)	
		51-70	0 (0)	3 (100)	0 (0)	
	Control	>70	3 (4.29)	61 (87.14)	6 (8.57)	0.141
		<10	2 (40)	3 (60)	0 (0)	
		10-30	0 (0)	27 (93.1)	2 (6.9)	
		31-50	2 (10)	18 (90)	0 (0)	
		51-70	0 (0)	10 (90.91)	1 (9.09)	
T3	Case	>70	0 (0)	5 (100)	0 (0)	0.08
T4		10-30	3 (17.65)	13 (76.47)	1 (5.88)	
		31-50	0 (0)	35 (89.74)	4 (10.26)	
		51-70	0 (0)	10 (90.91)	1 (9.09)	
	Control	>70	0 (0)	3 (100)	0 (0)	0.141
		<10	2 (40)	3 (60)	0 (0)	
		10-30	1 (3.45)	25 (86.21)	3 (10.34)	
		31-50	4 (20)	16 (80)	0 (0)	
		51-70	0 (0)	10 (90.91)	1 (9.09)	
	Case	>70	0 (0)	5 (100)	0 (0)	0.079
TSH		10-30	2 (11.76)	9 (52.94)	6 (35.29)	
		31-50	4 (10.26)	28 (71.79)	7 (17.95)	
		51-70	1 (9.09)	7 (63.64)	3 (27.27)	
	Control	>70	0 (0)	1 (33.33)	2 (66.67)	0.566
		<10	0 (0)	3 (60)	2 (40)	
		10-30	2 (6.9)	25 (86.21)	2 (6.9)	
		31-50	1 (5)	15 (75)	4 (20)	
		51-70	1 (9.09)	8 (72.73)	2 (18.18)	0.531
	Case	>70	0 (0)	5 (100)	0 (0)	
T3	Control	Female	2 (4.17)	40 (83.33)	6 (12.5)	
		Male	1 (4.55)	21 (95.45)	0 (0)	0.092
	Case	Female	2 (5.41)	33 (89.19)	2 (5.41)	
		Male	2 (6.06)	30 (90.91)	1 (3.03)	0.883
T4	Control	Female	2 (4.17)	40 (83.33)	6 (12.5)	
		Male	1 (4.55)	21 (95.45)	0 (0)	0.092
	Case	Female	3 (8.11)	32 (86.49)	2 (5.41)	
		Male	4 (12.12)	27 (81.82)	2 (6.06)	0.844
TSH	Control	Female	6 (12.5)	33 (68.75)	9 (18.75)	
		Male	1 (4.55)	12 (54.55)	9 (40.91)	0.116
	Case	Female	3 (8.11)	27 (72.97)	7 (18.92)	
		Male	1 (3.03)	29 (87.88)	3 (9.09)	0.282

High fasting blood sugar (FBS) was observed in between 10 to 30 years (10.34%) in cases and in control, >70 years group (7.14%) was observed. (Table 4) 3 male (9.09%) and 3 female (8.11%) was seen with high FBS in cases. It was 3 female and 2 male in control. The association between age group and diabetes mellitus was not statistically significant.

Table 4. Association between diabetes mellitus and age group in both groups

	Age group	Normal	Diabetes Mellitus	P value
	<10	17 (100)	0 (0)	
	10-30	35 (89.74)	4 (10.26)	
	31-50	10 (90.91)	1 (9.09)	
	51-70	3 (100)	0 (0)	
Control	>70	65 (92.86)	5 (7.14)	0.317
	<10	5 (100)	0 (0)	
	10-30	26 (89.66)	3 (10.34)	
	31-50	19 (95)	1 (5)	
	51-70	10 (90.91)	1 (9.09)	
Case	>70	4 (80)	1 (20)	0.733
Control	Female	45 (93.75)	3 (6.25)	
	Male	20 (90.91)	2 (9.09)	0.646
Case	Female	34 (91.89)	3 (8.11)	
	Male	30 (90.91)	3 (9.09)	0.563

Out of 70 cases, 38 was seen with localized vitiligo and 32 with generalized in which vitiligo vulgaris being the most common (Table 5). Family history of vitiligo was seen in 8 (11.42%) people in cases. 8 cases (11.42%) was observed with comorbidities. 28 (42%) out of 70 cases consider vitiligo as social stigma. 14 (20%) cases already presented with treatment history.

Table 5. Clinical pattern, family history, comorbidities, social stigma & treatment history in cases

Localized	Generalised	
38	32	
	Vitiligo vulgaris	22
	Acrofacialis	10
	Frequency	**Percentage**
Family history of vitiligo	8	11.42
Comorbidities	8	11.42
Social Stigma	28	40
Treatment History	14	20

DISCUSSION

Vitiligo is one of the common diseases worldwide and also in terai region of Nepal. Since skin is the reflection of internal disease, vitiligo shows the reflection of autoimmune disease. In our study, among 70 number of vitiligo patients, 47 (67.14%) were female and 23 (32.85%) were male. Similar results were reported in several studies.[12,14] Higher female numbers can be due to cosmetic concerns. Vitiligo vulgaris was the commonest clinical pattern we saw in our study which is comparable to Madhu H et al[12] and Sushmalatha et al[15] studies. Family history of vitiligo was seen in 8 patients (11.42%) in our study. Similarly 10% percent show family history in Madhu H et al[12] study.

The prevalence of thyroid dysfunction in case of our study is 42.7% in case and 61.5% in control. In contrast, the prevalence of thyroid dysfunction was higher in cases group than in control.[14] In this study, altered levels of T3,T4 & TSH were seen in 7(10%), 11(10.7%) and 14(20%) cases respectively. 3(4.3%), 4(5.7%) and 10(14.3%) cases have high levels of T3, T4 & TSH respectively. Whereas, 4 cases each have low T3 and 7 have low TSH. In Subba k. et al, also altered level of TFT was observed among 66 vitiligo patients with variation in T3, T4 & TSH7. Even in control we can observe the altered level of T3, T4 and TSH. In contrast to

our study, zero alteration shown in control group in Osman AM et al study.[16]

In Zettinig G et al study, prevalence of autoimmune thyroiditis was observed.[17] Significant association of thyroid dysfunction and vitiligo patients was seen in Madhu H et al[12] were among 104 cases 31 cases showed altered thyroid function test. Among 82 cases, 26 were shown with thyroid abnormality in J. Patel D et al[14] study.

The result of our study shows out of 70, 6 cases (8.6%) and 5 controls (7.1 %) had impaired fasting blood sugar. Similar observation where prevalence of case was 6.25% and control was 2.50% in Korde SS et al[18] Study. In case control study done in Iran by Shahid et al, 18(2.71%) cases out of 70 were seen with high FBS.[21] Male and female are equally seen with high FBS in our study. In Gopal KV et al study, more number of male shows with diabetes mellitus.[19]

Shamsadini S et al study shows 8.2 % of diabetes mellitus in vitiligo patients.[20] In a systematic review and metanalysis, significant association of diabetes mellitus and type I diabetes was found.[21] Martis J et al study shows 9 people with diabetes mellitus out of 100 people.[22]

Many studies have already been conducted which have shown the thyroid dysfunction and diabetes mellitus in vitiligo patients. Our study also shows the similar pattern of alterations of blood sugar and thyroid function test in vitiligo patients. So these prove the association of autoimmunity to vitiligo.

CONCLUSION

From our study we saw the prevalence of diabetes mellitus more in cases than in control groups. The abnormal thyroid function test seen in our cases too. Thyroid function test and fasting blood sugar should be checked to prevent the abnormality.

FINANCIAL SUPPORT AND SPONSORSHIP

None

CONFLICT OF INTEREST

None

REFERENCES

1. Stephen O, Kovacs. Vitiligo. J Am Acad Dermatol. 1998;38:647-66;667.
2. Hann SK, Nordlund JJ. Definition of vitiligo. In: Hann SK, Nordlund JJ, editors. Vitiligo: A Monograph of the Basic and Clinical Science. Oxford: Blackwell Science Ltd.; 2000. p. 3-5.
3. Hann SK, Kim YS, Yoo JH, Chun YS. Clinical and histopathologic characteristics of trichrome vitiligo. Journal of the American Academy of Dermatology. 2000 Apr 1;42(4):589-96.
4. Katz SI, Gilchrest BA, Paller AS, Leffell DJ. Fitzpatrick's dermatology in general medicine. Wolff K, Goldsmith LA, editors. New York: McGraw-Hill; 2008.
5. Njoo MD, Westerhof W. Vitiligo: pathogenesis and treatment. American Journal of Clinical Dermatology. 2001 Jun;2:167-81.
6. Kemp EH, Waterman EA, Weetman AP. Autoimmune aspects of vitiligo. Autoimmunity. 2001 Jan 1;34(1):65-77.
7. Subba K, Karn D, Khatri R. Triiodothyronin, thyroxine and thyrotropin in vitiligo. Kathmandu University Medical Journal. 2011;9(2):7-10.
8. Gopal KV, Rao GR, Kumar YH. Increased prevalence of thyroid dysfunction and diabetes mellitus in Indian vitiligo patients: A case-control study. Indian Dermatology online Journal. 2014 Oct;5(4):456.
9. Yuan J, Sun C, Jiang S, Lu Y, Zhang Y, Gao XH, Wu Y, Chen HD. The prevalence of thyroid disorders in patients with vitiligo: a systematic review and meta-analysis. Frontiers in Endocrinology. 2019 Jan 15;9:803.
10. Robert P. Über die Vitiligo. Dermatology. 1941;84(5–6):257–319
11. Van Den Boorn JG, Konijnenberg D, Dellemijn TA, Van Der Veen JW, Bos JD, Melief CJ, Vyth-Dreese FA, Luiten RM. Autoimmune destruction of skin melanocytes by perilesional T cells from vitiligo patients. Journal of Investigative Dermatology. 2009 Sep 1;129(9):2220-32.
12. Madhu H, Sindhura M. Study of relationship between thyroid dysfunction and vitiligo: International Journal of Medicine. 2021:17:3:70-74.
13. Shahid S, Ahmad Reza T, Zari J, Akbar D, Shadi T, Taregh B, Saeed D, Mohammad M. Association between vitiligo and diabetes mellitus: a case control study. Iranian Journal of Dermatology. 2014 Jan 1;17(1):22-6.
14. J. Patel D, T. Solanki N, R. Makwana D, S. Parmar K, et al. A study of correlation between thyroid abnormalities and types of vitiligo. International Journal of Advanced Research. 2022 Dec 31;10(12):779–83.
15. Sushmalatha B. A study of thyroid profile abnormalities in vitiligo patients in tertiary care center of South India, in Telangana. International Journal of Research. 2019 Jul;5(3):611.
16. Osman AM, Mirghani YA. Thyroid dysfunctions in sudanese patients with vitiligo. Sudan Journal of Medical Sciences. 2010;5(1).
17. Zettinig G, Tanew A, Fischer G, Mayr W, Dudczak R, Weissel M. Autoimmune diseases in vitiligo: do anti-nuclear antibodies decrease thyroid volume?. Clinical & Experimental Immunology. 2003 Feb;131(2):347-54.

18. Korde SS, Gugle AS, Pawar MK. A Study of Association of Diabetes Mellitus and Vitiligo Patients. MVP Journal of Medical Sciences. 2018 Dec 17:125-33.

19. Gopal KV, Rao GR, Kumar YH. Increased prevalence of thyroid dysfunction and diabetes mellitus in Indian vitiligo patients: A case-control study. Indian Dermatology online Journal. 2014 Oct;5(4):456.

20. Shamsadini S, Saberi S. Prevalence of Diabetes and glucose abnormalities in patients with vitiligo in Kerman In 1999. Avicenna Journal of Clinical Medicine. 2002 Mar 15;8(4):0-0.

21. Chang HC, Lin MH, Huang YC, Hou TY. The association between vitiligo and diabetes mellitus: A systematic review and meta-analysis. Journal of the American Academy of Dermatology. 2019 Dec 1;81(6):1442-5.

22. Martis J, Bhat R, Nandakishore B, Shetty JN. A clinical study of vitiligo. Indian Journal of Dermatology, Venereology and Leprology. 2002 Mar 1;68:92.