

Prevalence of Vitiligo and Associated Factors Among Adult Patients Attending Ayder Referral Teaching Hospital Dermatology Clinic in Mekelle Town, Tigray Region-Northern Ethiopia

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Abstract

Background: Vitiligo is skin disease having a major impact on the quality of life of the patient suffering from it. The substantial disfigurement associated with vitiligo can cause serious emotional stress for the patient, which necessitates treatment. The total number of people suffering from vitiligo is estimated at around 65-95 million people worldwide and little known about Vitiligo in Ethiopia **Objective:** To determine the prevalence and associated factors of vitiligo among patients attending dermatology outpatient department at Ayder Referral Teaching Hospital in 2014 **Methods:** A facility based cross sectional study design was conducted among 423 adults aged 14years and above in Ayder referral hospital from July to September ,2014.All adult patients who attend the Dermatologic OPD, in Ayder Referral Hospital on the study period was included in the study by systematic random sampling technique.Information regarding socio-demographic, disease related, and associated risk factors were obtained from the patients during hospital visit with interviews and skin physical examination was during data collection process, the data was checked for completeness and data was entered and analyzed using SPSS statistical software(version 20). Findings were summarized using descriptive statistics and multivariable binary logistic regression was used to identify the independent predictors of vitiligo at 5% *p* value.

Result: Prevalence of vitiligo was found to be 9.4%. The mean age at onset of the disease was 27.37 ± 12.91 years. Among 405 patients 11(2.7%) of the patients had a family history of vitiligo. Lower limbs (28.9%) followed by head and neck (21.1%) were the initially most affected parts. Major precipitating factor was found to be physical trauma (46.2%). Alopecia areata was the most common autoimmune disorder observed (33.3%). Factors like place of residence, similar problem in the family, triggering factors and associated disease are significant association with vitiligo by multivariable logistic regression.

Conclusion: Generalized vitiligo is the most common clinical type observed. Generally factors like place of residence, similar problem in the family, triggering factors and associated disease are significant association with vitiligo. Educate about triggering factors and screen for autoimmune disease all Vitiligo patients was recommended.

Keywords: Vitiligo, clinical character, risk factors and Ethiopia

1. INTRODUCTION

1.1 Background

Vitiligo is an acquired pigmentary skin disorder characterized by white (de-pigmented) patches in the skin, caused by the loss of functioning melanocytes. That affects both sexes equally, and can develop at any age. The hair, and rarely the eyes, may also lose color. Vitiligo patches can appear anywhere on the skin, but common sites are usually around the orifices, the genitals, or sun-exposed areas such as the face and hands. The disease is classified as generalized or localized; according to its extent and distribution. [1]. It is a non-lethal and it does not cause any organic harm, but it has a devastating effect on social life of the affected person and their family also that cause emotional trauma in both children and adults. [2]

Vitiligo is multifactorial polygenic disorder with complex pathogenesis; although several theories have been proposed to explain the loss of epidermal melanocytes like; genetic, immunological, biochemical (including oxidative stress), and neurogenic factors may interact to contribute to its development [3]. From a few epidemiological studies of Vitiligo, it is believed that one third of people with Vitiligo had history of the same condition with in close family, suggesting that genetic factors have an important role in the development of the

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disease, and this is supported by several genetic susceptibility studies.^[1,2] specifically, neutrophilactivating protein (NAP-1) predisposes people to Vitiligo as well as to various autoimmune diseases.

However, certain factors have been identified like trauma to the skin, hormonal changes, and stress may be necessary for the disease to become apparent.^[3] Autoimmune mechanisms are thought to be responsible in the pathogenesis of Vitiligo, especially in generalized or focal non-dermatomal type^[4].

A generalized type of Vitiligo clinically present as symmetrical de-pigmented patch. A less common type is the segmental form in which asymmetrical, focal or dermatomal de-pigmentation patch or macules develop. In addition to white patches on the skin, people with vitiligo may have poliosis of the scalp hair, eyelashes, eyebrows, and beard

The diagnosis of vitiligo is made more clinically, but certain pertinent medical history like a family history of vitiligo; skin trauma that occurred at the site of vitiligo two to three months before de-pigmentation started; stress or physical illness; and graying of the hair before age 35, and also rarely, laboratory tests were used.^[5]

Vitiligo is estimated to affect 1% of the world's population, regardless of age, sex, and skin color.^[5,6] It affects all age groups, but it is very rarely reported to be present at birth. In a Dutch study, fifty percent of people reported that the disease appeared before the age of 20 years.^[7,8] the prevalence of Vitiligo varies in different areas of the world due to cultural and social differences. In countries where more stigma is attached to the disease for cultural or social reasons or because it is more visible because of dark skin color, more people with the disease are likely to consult a doctor than in other countries where this is not the case, thus reported estimates of prevalence may be high. Figures as high as 8.8% have been reported in India where stigma associated with the disease is high.^[9]

The current treatments for Vitiligo are difficult, expensive, and often disappointing. The degree of re-pigmentation that defines success has been arbitrarily set in many studies as 50% to 75% re-pigmentation, based largely on the global impression of the overall response.^[10] Hence the prevalence and associated factors of Vitiligo is not known as required in Mekele (Ethiopia). This cross sectional study will be to explore the prevalence and associated factors for Vitiligo in Mekelle, Ethiopia.

Method

Study area and period

This study was conducted in dermatology clinic Ayder referral hospital from July to September, 2014 in Mekelle. Mekelle, the capital city of the Tigray National Regional State, lies about 780 km north of Addis Ababa. According to local historians Mekelle was founded in the 13th century. However, its heyday came soon after Emperor Yohannes IV was crowned as king of the kings of Ethiopia (1871-1889). Mekelle Spread out on a plain and partly encircled by a chain of mountains, the city is placed at an altitude of 2200 meters above sea level with an average annual temperature of 20.96 degree Celsius and rain fall of 58.75 millimeter. The city is administratively divided in to 7 sub city administrative, it covers 28 square KM^[11]. According to the 2012 National population and housing census of Ethiopia, Mekelle town has a total population of 249,967, of whom 122,483 are men and 127,483 women out of this pollution under five 12%, 63% under 25years, 52% are reproductive age groups and 65% are above 15years

Mekelle city has 4 governmental (1 referral) and 2 private hospitals, 8 governmental health centers, 32

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private clinics, 3 dental private clinics, 5 private diagnostic laboratories, 32 private pharmacies and 3 private physiotherapy centers which serves for a total of Mekelle residents 249,967 and the surrounding nearby wereda, zones and region population (Projected population of Mekelle in 2008). These both governmental and private health institutions provides health care services on maternal reproductive health, child health, prevention and control of communicable disease, and numerous activities on non communicable diseases through providing a diagnostic, preventive, therapeutic and rehabilitative services having a coverage 83% since 2009. [1].

The Ayder Referral teaching and referral Hospital, built by Gebru Asrat who was a former president of Tigray Region (1991–2001), commenced rendering its referral and specialized medical services in 2008 to the 8million population in its catchment areas of the Tigray, Afar and Southeastern parts of the Amhara Regional States. It provides a broad range of medical services to both in and out patients of all age groups. As such, the Hospital can be designated as the most advanced medical facility, by all accounts, in the Northern part of the country and that it stands as the second largest hospital in the nation. It has four hundred eighty beds for inpatient services.

Study design, study population and sampling

A facility based cross sectional study design was used and among all patients who visited the dermatology outpatient department during the study period were involved.

The sample size was determined by using single population proportion formula with confidence interval 95% and 5% margin of error. Sample sizes were determined based on the maximum variability in the community (50%) and considering 10% of non-respondent rate the final sample size becomes 423.

Sampling technique

Ayder teaching and referral hospital is the only regional referral hospital where better number of dermatology case was get services .The Hospital give service for the regional population and to the nearby other regions patients. Thus, most patients with Vitiligo are come to the Hospital from different health facilities by referral paper from catchment areas. Systematic sampling technique was used to identify the study subjects. In average a minimum of 45 adult patients visit dermatology OPDs from Monday to Friday for treatment seek in each day. In total 225 patients seek the treatment perweek (within 5 working days). In this study we included every 3rd adult patient coming to the OPDs according to their visit

Data Collection Tools and Procedures

Patients were informed and written consent was provided by the patient with a clear description of the objectives and procedures of the study. A structured questionnaire were prepared by English then translate to local language then again translate to English to check consistence. This structured questionnaire used to collect the required information from every 3rd individual subjects who satisfy inclusion criteria. A detailed history regarding the age, sex, and occupation, family history of the some disease, associated disease, triggering factor and course of the disease was taken and a check list was used to evaluate patients clinically. The patients were diagnosed clinically by three postgraduate Tropical dermatology students in three OPD. To facilitate the data collection and for clinical evaluation of the patient's three nurses from dermatology OPD was included to conduct the data collection and clinical evaluation. All the patients with dermatological manifestation will be given appropriate treatment and accordingly.

Data Management and Quality

One day Training was given to data collectors and supervisor on how to collect data from the patients. Pre-test was done on 5% of the questionnaires at Ayder referral hospital in medical OPD based the result of the pretest necessary corrections were made on the questionnaire. During data collection period adequate supervision was undertaken by supervisors and investigators. In addition 15% of the questionnaire was randomly entered to avoid errors during data entry. Besides this, the principal investigator was carefully enter and thoroughly cleaned the data before the commencements of the analysis.

Data Analysis

The data was analyzed using SPSS version 20. Frequencies and percentages were done for categorical variables. Normality for the population distribution will be checked with histogram for continuous variables, for non-normally distributed population the measures of central

tendency (median) and measure of dispersion (inter-quartile range) was reported. To see the association between dependent and independent variables chi-squared test was done.

Binary logistic regression analysis was carried out using bivariate logistic regression to determine the

¹ Tigray regional state bureau of plan and finance September, 2003 E.c, 28-30

magnitude, direction and strength of association between a set of independent variables and the dependent Variable and finally those variables significant at 5% with the outcome variable was selected for multivariate analysis. As a result the final model was developed.

Operational Definition

Vitiligo: is circumscribed de-pigmented skin disorder, characterized by milky white patches/macules without scale of different sizes and shapes

Focal vitiligo: Usually a solitary macule or a few scattered macules in one area, most commonly in the distribution of the trigeminal nerve, although the neck and trunk are also commonly involved (One or more macules in one area but not in segmental pattern)

Segmental vitiligo: Unilateral macules in a dermatomal. (One or more lesions localized in unilateral pattern)

Acrofacial vitiligo: Depigmentation of the distal fingers and periorificial areas. (Macules localized on face and distal extremities)

Generalized vitiligo(vitiligo vulgaris): Depigmented patches are widely and usually symmetrically distributed.(symmetrical distribution of lesions affecting many parts of body)

Universal vitiligo: Depigmented macules and patches over most of the body (de-pigmentation involved in more than 80% of the body)

Mucosal vitiligo: Involvement of the mucus membrane sites only

Ethical Consideration

The proposed work was ethically cleared by Institutional Ethical review board (IRB) of the college of Health science and Medicine, Mekelle University. Only Volunteer patients were participating in this study. They were informed about the objectives and the nature of the study as well verbally consented. Confidentiality was kept by using code number rather than the name of the patients.

Results

Socio-Demographic Characteristics of the Respondents

A total of 405 study subjects participated in the study, making a response rate of 95.7%. More than one half 206 (50.9%) of the study participants were females. Regarding age distribution, 50.9% of the Respondents were aged between 14-24 years. Mean age (standard deviation) of respondents was found to be $27.97 \pm (12.557)$ years with minimum and maximum age of 14 and 80 years, respectively. With regard to their marital status, 231(57%) were single and 174(43%) were married. Majority of the respondents were Tigraway by ethnicity 388 (95.8%) and 390 (96.3%) and 15(3.7%) were Christian and Muslim religion followers, respectively. Regarding educational background of respondents, 134 (33.1%) were at primary school and 120(29.6%) were at secondary school. About 124(30.6%) of the study subjects were students by occupation and with respect to their residence, most of them were urban residents 315(77.8%) [Table-1]

Prevalence and disease related condition

Of the 405 patients, who attended the dermatology outpatient department of the study center over a period of one months, 38(9.4%) had vitiligo. Males 22(57.9%) were affected more than females 16(42.1%) giving a male to female ratio of 1.4:1. Among the 38 patients ,23 (60.5%) were from urban areas. Of the 38 patients,15(39.5%) of the study population was within the age group of 25-34 years while 14(36.8%) were with the age group of 14 – 24 years age group .The youngest patient was 16 years old and the oldest was 65 years. The earliest onset was 8 years of age, whereas the latest was 61 years of age. Duration of the disease at the time of presentation varied from 1 month to 18 years. Most cases, 30(78.9%), were less than 5 year's duration. The most common site of initial onset was the lower limbs, 11(28.9%), and followed by the mucosal area, 8(21.1%). Among 38 patients who have vitiligo, 14 (36.8%) had vitiligo vulgaris and 11(28.9%) had focal vitiligo. [Table-2]

Associated risk factors for vitiligo

Family history was found in 11(2.7%) of the patients. Family history in first-degree relatives was 54.5% and in second degree relatives 45.5%. Precipitating factors found in 13(3.2%).Major precipitating factor of vitiligo was found to be physical trauma/ injury 6(46.2%) and emotional upset 4(30.8%). Associated disorders were present in 12(3%) of the patients. Associated systemic disorders in this study were thyroid disorder and diabetes mellitus was found equally in 3(25%) patients. The associated cutaneous diseases noted in this study were Alopecia areata 4 (33.3%). [Table 3]

In the bi-variate analysis age, occupation, residence, history of family vitiligo, precipitating factors, and associated disease with vitiligo were found to be significantly associated with the Vitiligo. Rural residence was 2.54 times more likely to be affected by vitiligo as compared to the urban residence. Respondents aged 25-34years were more affected by vitiligo than 14-24 years and >34 years age group (COR =2.54; 95%CI =1.26,

5.1). Respondents who have a similar history of vitiligo in the family have 6.05 times more likely to be affected by vitiligo than those who have no such problem in the family (COR=6.05; 95% CI=1.69, 21.7). The patients who have triggering factors are more prone to vitiligo than those who have no triggering factors (COR=11.28; 95% CI=83.44, 3). Patients who have associated disease with vitiligo are more likely to develop vitiligo (COR=7.8; 95% CI=2.34, 25.9) than those who have no associated disease with vitiligo.

In the multivariable analysis, place of residence, similar history of vitiligo in the family, triggering factors and associated disease with vitiligo are significantly associated with vitiligo. Participants who were residing in rural areas were more affected by vitiligo than urban residence (AOR=3.881; 95% CI=1.56, 9.69). Participants with the same problem in the family are more likely to be affected by vitiligo than those without the same problem in the family (AOR=5.3; 95% CI=1.11, 24.99). Respondents who have triggering factors have 16.03 times the chance to develop vitiligo than those without triggering factors. Patients with associated disease have a higher risk for developing vitiligo than those without associated disease (AOR=11.495; 95% CI=2.8, 46.83) [Table -4]

Discussion

In this study, the prevalence was found to be 9.4%, which was higher than reported in previous studies. 1.3% study conducted in India; 2.14% study done in western Nepal, Nepal; 1.8% in Iran; 2.64% in Kumaun region of Uttarakhand, India; 0.38% in Denmark; 0.7% in China and 4.96% **Study done in Nigeria** [1, 2, 3, 4, 5, 6, 7]. The high prevalence in this study may be due to the study area which was conducted in a specialized and referral hospital for the Tigray region where all vitiligo patients in the region get treatment only in this hospital. Also, the varying ethnic backgrounds of the population residing in different geographic regions with varying environmental conditions may contribute to the wide variation in the prevalence of vitiligo in the world.

In this study, vitiligo was found to be more common in the age group of 25-34 years, which is in agreement with other reports [8]. The female to male ratio of vitiligo patients observed in this study was found to be nearly equal (1:1.04), which is in agreement with other reports 1:1.05 Manipal hospital, India [23]. This implies that this disease has no predilection for any gender. In 15 (39.9%) of patients, the age at onset was between 21-30 years, which is consistent with reports from Nigeria [22].

Vitiligo vulgaris (14/36.8%) was the most common clinical type in this study. This is the same as the study in Manipal hospital, India. Generalized vitiligo (31.3%) was the most common type [23]. But the study done in Kumaun region of Uttarakhand, India, acrofacial type of vitiligo (44.5%) was observed to be the most common, followed by vitiligo vulgaris [9]. The frequency of distribution of clinical types of vitiligo varies in different studies. However, with the present state of my

Knowledge, it is difficult to comprehend the mechanisms and determinants underlying varying clinical patterns of vitiligo seen in different patients.

In this study, place of residence is significantly associated with vitiligo. People living in rural areas have more chance to develop the disease than urban residence (AOR=3.88, 95% CI=1.56, 9.69). There are no other reports which line up against this finding. This may be due to most of the rural population working outdoors and being easily prone to trauma.

There was a family history of vitiligo in 2.7% (P<0.001) of patients in this study, which was lower than same

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hospital-based studies in china 9.8 % ($P < 0.01$)^[1]. Whereas other studies reported 18%, and even 6.25^[2]. Genetic factors is one of the most cause vitiligo among the family member .In this study the same problem in the family member small may be due to marriage between the family not common in Ethiopia. In others study high due to high incidence of consanguineous marriages.

The precipitating factors were noticed 13 (3.2%) patients. Physical trauma / injury and emotional upset the most common precipitating factors 6 (46.2%) and 4(30.8%) respectively. which was higher than study done in India^[3]. This maybe due to most of the people in this area works outdoor and easily prone to trauma also majority people economical dependent due to this emotional upset more common. Various studies undertaken to determine the factors precipitating vitiligo include emotional stress, sun burn, major illness, surgical procedure, pregnancy, and physical trauma^[4].

Association of vitiligo with other diseases/ abnormalities has also been a subject of great interest. In this study associated disorder with vitiligo 3 % ($p < 0.001$) this is in line with study done in Mumbai, India 3 %^[27] but other study shows high study in Iran 18.9 %^[5]. The small finding in this study maybe due to not investigate for autoimmune disease only it depend on history and physical examination.

Conclusion and recommendation

Conclusion

The prevalence of Vitiligo was 9.4% in this study.

Associated factors such as place of residence, the same problem in the family, associated autoimmune disease are significantly associated factors with Vitiligo.

Recommendations

Based on the findings of the study, the following recommendations are made:

To regional health bureau

The prevalence of vitiligo high in this study it needs professional person in this area to diagnosis and treated properly.

To Ayder referral Hospital and health facility works within the hospital

Educate the people the cause of vitiligo and the treatment availability because majority not knows the cause it thinks as non treatable disease.

Educate the community to avoid triggering factors for vitiligo such as physical trauma, unfit footwear and emotional upset.

Investigate all vitiligo patients for thyroid disorder and diabetic mellitus and treated accordingly.

Educate marriage conduct between family members /consanguineous marriages

Further study is required to assess the true prevalence and associated risk factors in the community.

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Abbreviations

BSC...Bachelor of Science
 DC...Data collector
 IRB... Institutional Ethical review board
 Km²...Square Kilometer
 MU...Mekelle University
 MSC...Master of Science
 NAP...Neutrophilactivating protein
 OPD...Outpatient Department
 SPSS... Statistical Package for Social Sciences

Authors' Contribution

Author 1: AE: Initiated the research, wrote the research proposal, conducted the research, did data entry and analysis and wrote the manuscript.

Author 2: AG: Involved in the write up of the proposal, write up of the manuscript. All authors read and approved the final manuscript.

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Competing Interests

Author(s) disclose no potential conflicts of interest.

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Table-1: Socio-demographic characteristics of the adult patients attending dermatology OPD, in mekelle town, Northern Ethiopia, July- September 2014 (n=405)

Variables	Categories	Frequency	Percent
Age (years)	14-24	206	50.9
	25-34	100	24.7
	35-44	55	13.6
	>=45	44	10.9
Sex	Male	199	49.1
	Female	206	50.9
Marital status	Married	174	43
	Single	231	57
Ethnicity	Tigre	388	95.8
	Others *	17	4.2
Religion	Christian	390	96.3
	Muslim	15	3.7
Educational status	Illiterate	57	14.1
	Grade 1-8	134	33.1
	Grade 9-12	120	29.6
	Diploma & above	94	23.2
Occupation	Farmer	85	23
	Government employee	73	18
	Private organization	59	14.6
	Daily laborer	64	15.8
	Student	124	30.6
Residence	Urban	315	77.8
	Rural	90	22.2

NB;* Ahmara, Afar and Oromo

Table .2: Frequency distribution shows disease related characteristics of the adult patients attending OPD, in mekelle town, Northern Ethiopia, July-September 2014 (n=405)

Variable	Categories	Frequency	Percent
Vitiligo	Yes	38	9.4
	No	367	90.6
Clinical type of Vitiligo	Vitiligo vulgaris	14	36.8
	Focal vitiligo	11	28.9
	Acrofacial vitiligo	5	13.2
	Segmental vitiligo	2	5.3
	Mucosal vitiligo	6	15.8
Age of vitiligo lesion onset	<10years	1	2.6
	10-20years	12	31.6
	21-30years	15	39.5
	31-40years	4	10.5
	41-50years	2	5.3
	51-60years	3	7.9
	>60years	1	2.6
Duration of the lesion since first visit	<1year	18	47.4
	2-3years	8	21.1
	4-5years	5	13.2
	>5years	7	18.4

Table .3 Associated risk factors for vitiligo among adult patients attending OPD, in mekelle town, Northern Ethiopia, July-September 2014(n=405)

Variable	Categories	Frequency	Percentage
Similar problem in family	Yes	11	2.7
	No	394	97.3
Degree of family member	First degree	6	54.5
	Second degree	5	45.5
Triggering factor	Yes	13	3.2
	No	392	96.8
Type of triggering factors	Physical trauma/injury	6	46.2
	Emotional upset	4	30.8
	Footwear	3	23
Associated disease with vitiligo	Yes	12	3
	No	395	97
Type of associated disease	Thyroid disorder	3	25
	Diabetes mellitus	3	25
	Alopecia areata	4	33.3
	Leukotricha	2	16.7

Table: 4. Factors associated with vitiligo among adults attending dermatology clinic, mekelle city, July- September 2014

Variable	Categories	Vitiligo		COR(95% CI	p-value	AOR(95%)CI	P-value
		No	Yes				
Age group	14-24	192(93.2%)	14(6.8%)	1		1	
	25-34	85(85%)	15(15%)	2.4(1.12,5.24)*	0.025	1.99(0.630,6.285)	0.241
	25-44	52(94.5%)	3(5.5%)	0.79(0.22,2.86)	0.721	0.49(0.91,2.752)	0.425
	>45	38(86.4%)	6(13.6%)	2.17(0.78,5.99)	0.137	0.38(0.040,3.573)	0.379
Occupation	Farmer	78(91.8%)	7(8.2%)	1.15(0.4,3.21)	0.8	0.447(0.1,1.995)	0.292
	Gov't employee	59(80.8%)	14(19.2%)	3.03(1.24,7.4)*	0.015	1.682(0.43,6.612)	0.456
	Privet organization	54(91.5%)	5(8.5%)	1.2(0.38,3.7)	0.77	1.159(0.29,4.586)	0.834
	Daily laborer	61(95.3%)	3(4.7%)	0.63(0.164,2.4)	0.49	0.298(0.55,1.620)	0.161
	Students	115(92.7%)	9(7.3%)	1		1	
Residence	Urban	292(92.7%)	23(7.3%)	1		1	
	Rural	75(83.3%)	15(16.7%)	2.54(1.26,5.1)*	0.009	3.881(1.56,9.7)**	0.004
Similar problem in the family	Yes	7(63.6%)	4(36.4%)	6.05(1.7,21.7)*	0.006	5.3(1.11,24.99)**	0.036
	No	360(91.4%)	34(8.6%)	1		1	
Triggering factors	Yes	6(50%)	6(50%)	11.31(3.4,37)*	0.0001	16.3(4.18,63.6)**	0.0001
	No	361(91.9%)	32(8.1%)	1		1	
Associated disease with Vitiligo	Yes	7(58.3%)	5(41.7%)	7.8(2.34,25.9)*	0.001	11.4(2.8,46.83)**	0.001
	No	360(91.6%)	33(8.4%)	1		1	

Variable like sex ,religion , degree of family member ,type of associated disease and type of triggering factors test by bi-variate p>0.2 not inter to multivariable analysis .

N:B**significant association with vitiligo by multivariable analysis

