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Prevalence of Alopecia Areata and associated diseases in Hail Region, Saudi Arabia

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ABSTRACT

Background: Alopecia areata (AA) is a multifactorial inflammatory autoimmune disease which causes pattern baldness on scalp and other body parts. Although it is not a life threating condition it affects a person physiological health. It is not a rare condition and affects 2% of the global population. Up till now, status about its prevalence and gender distribution in Hail region, Saudi Arabia has not been surveyed. *Objective:* The study aimed to asses Alopecia Areata prevalence, characteristic, gender differences and associated diseases in Hail region, Saudi Arabia. *Methodology:* A cross-sectional questionnaire-based study was performed among Hail city population from September to November 2021. *Results:* Up to 813 participants completed the questionnaire; we found the prevalence of AA in Hail to be (18.21%). Allergic rhinitis was the most disease encountered to be related to AA (8.55%) followed by Thyroid diseases (7.24%). From the participant only 12 were diagnosed with COVID-19 (11%) of them noticed hair fall in the period after infected with COVID-19 and Only (4.20%) of patients affected with AA reported a relapse after receiving a vaccine dose *Conclusion:* Overall, we found that AA is more prevalent in Hail compared to other studies done in Saudi Arabia and the west. The study showed that AA is more in males when compared to females. It also revealed that there is minimal chance of having AA relapsed either after infestation with COVID-19 or receiving a vaccine dose.

Keywords: alopecia areata, hair loss, alopecia prevalence, hail, hair fall

1. INTRODUCTION

Alopecia areata (AA) is a form of inflammatory autoimmune disease characterized by non-scarring hair fall in oval to circular areas, which is reversible in most cases (Alzolibani, 2011; Spano & Donovan, 2015). Many skin diseases have negative impact on patients' quality of life and self-esteem. AA exhibits this negative effect (Paus & Arck, 2009; Picardi et al., 2003). AA is not uncommon autoimmune disease, its affects 2% of the global population. AA can affect both adults and children, its prevalence in children are higher than adults (Lee et al., 2020). In Saudi Arabia AA prevalence was 13.8% (Al-

Ajlan et al., 2020). Another study conducted in Taif, a city in Saudi Arabia the prevalence of AA was 6.75% in males and 6.375% in females (Abd El-Mawla & Maghrabi, 2015).

AA can vary in terms of its severity and clinical presentation from small, tiny, and well-circumscribed areas of hair loss to diffuse and progressive total hair loss. AA is usually diagnosed clinically but if the diagnosis is doubt skin biopsy will confirm it. There is no curative therapy for AA. At present, there are two evidenced based approaches to treat AA: intralesional glucocorticoids injections and the induction of contact allergy (Gilhar et al., 2012). Despite the high incidence of AA, there is no previous study conducted in Hail, Saudi Arabia.

2. METHODOLOGY

Study design and study sample

A descriptive cross-sectional community-based study was carried out during 2021 (from September 2021 – to November 2021) to determine the prevalence of Alopecia Areata. The study involved the distribution of (813) questionnaires to randomly selected people from different groups in the general population of Hail city, located in north- western of Kingdom of Saudi Arabia.

Data collection

A self-administered close-ended questionnaire was design. The questionnaire was translated into Arabic and approved by 1 dermatologist, thereafter, tested for both comprehension and readability by 27 subjects who were not included in the study. It consisted of 17 questions which were guided by study objectives. The questionnaire included 4 sections:

First part of the questionnaire focused on demographic data, including age, gender, and country of residence. Second part was focused on AA-related information, including at which age the patient got alopecia, which body parts were affected, what treatment the patient use and if there was family history of AA or not. The third part included covid 19 exposure and vaccines related questions. As for the last sections, it included questions about the quality of life and associated diseases.

Questionnaires were prepared in the Arabic language. These questionnaires were sent out to friends, relatives, employee, university students and distributed through the community of Hail city, Saudi Arabia. Objectives of the study were explained, and a verbal consent was obtained from each of the participants.

Data analysis

Data were entered and analyzed using the Statistical Package for Social Sciences (SPSS). Results of the prevalence and knowledge of respondents on Alopecia Areata, such as information including affected body part, treatment type, age of onset and family history. As well as, covid 19 exposure, vaccines, and quality of life of people who have the disease were tabulated.

3. RESULTS

Demographic information

As shown in Table (1) and Figure (1) 813 people lived in Hail city, participated in the current study including (52.89%) male and (47.11%) female. 52.64% held a bachelor degree. Most of them were in the middle age with advantage for 21-30 years (41.70%).

Table 1 demographic information

Statement		N (%)
Gender	Male	430(52.89%)
	Female	383(47.11%)
Educational level	Primary	8(0.98%)
	Middle school	41(5.04%)
	Secondary school	281(34.56%)
	Bachelor	428(52.64%)
	Post graduated	55(6.77%)
Age	1-10 years	4(0.49%)
	11-20 years	167(20.54%)
	21-30 years	339(41.70%)

	31-40 years	149(18.33%)
	41-50 years	112(13.78%)
	> 51 years	42(5.17%)

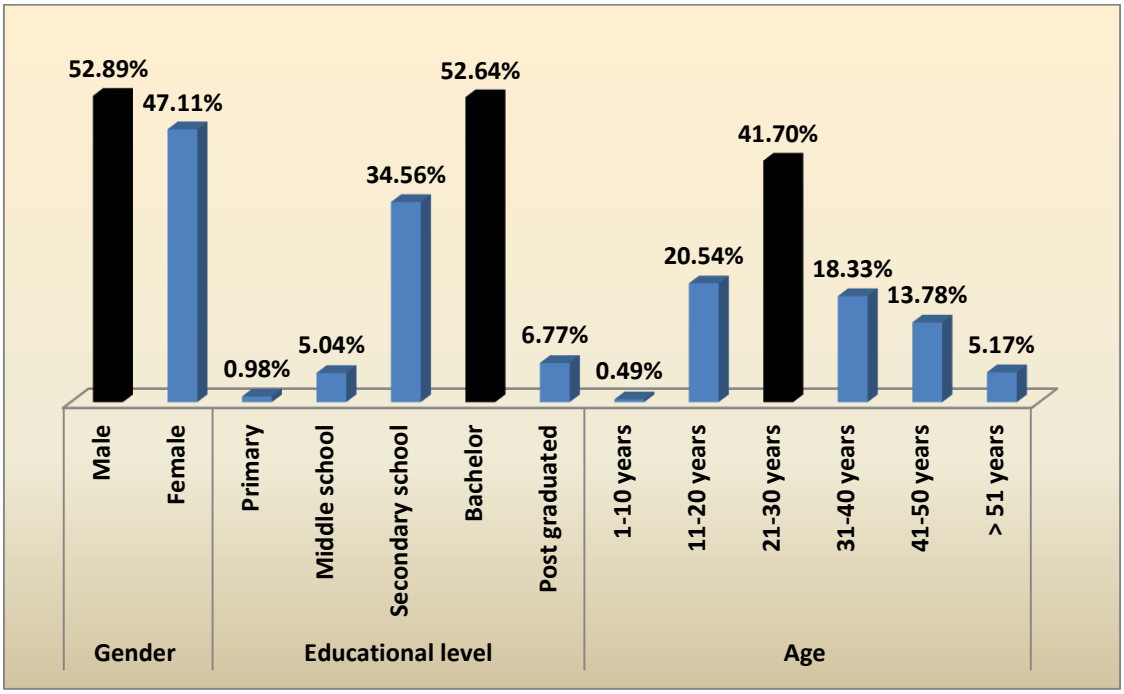

Figure 1 Demographic information

History of alopecia areata and gender differences

As shown in Table (2) 81.80% did not have alopecia areata, while only 10.95% had it, 7.26% participated on behave of relatives. Total of 18.21% were either suffering or have history of AA. 31.76% had diagnosed of alopecia one 21-30 years, and 22.30% in the 31-40 years. 45.27% diagnosed by their self, while 40.54% were diagnosed by doctor. 80.41% thought that alopecia areata is acquired. 27.03% had alopecia areata lasts for 3 months and 25.68% still sick. 33.33% reported that alopecia disease affected their quality of life in general.

In term of gender difference, male reported a higher in having alopecia areata, while female reported higher in reported on behave of relatives (X^2= 23.70, p<0.001), also the younger female reported higher than younger male in the diagnosis of alopecia (X^2= 16.43,p<0.01,=0.006). And female reported that diagnosed with alopecia areata by a doctor, while male by their self (X^2= 8.36,p<0.05,=0.015).

Table 2 History of alopecia areata and gender differences (N=148)

Statement		N (%)	Gender		
			Male	Female	X^2 / p value
Have you ever had alopecia areata? (Alopecia is the loss of part of the hair on the head or body) (N=381)	Yes	89(10.95 %)	66(74.2%)	23(25.8%)	23.70***/<0.001
	No	665(81.80%)	343(51.6%)	322(48.4%)	
	I answer instead of a person got the disease (my son, daughter, younger brother.)	59(7.26%)	21(35.6%)	38(64.4%)	
How old were you at the diagnosis of alopecia?	1-10 years	29(19.59%)	9(31%)	20(69%)	16.43**/0.006
	11-20 years	28(18.92%)	18(64.3%)	10(35.7%)	
	21-30 years	47(31.76%)	29(61.7%)	18(38.4%)	
	31-40 years	33(22.30%)	21(63.6%)	12(36.4%)	

	41-50 years	9(6.08%)	9(100%)	0	
	> 51 years	2(1.35%)	1(50%)	1(50%)	
Have you been diagnosed with alopecia areata by a doctor? Or in another way?	by a doctor	60(40.54%)	27(45%)	33(55%)	8.36*/0.015
	I diagnosed myself	67(45.27%)	47(70.1%)	20(29.9%)	
	It was discovered by someone (the barber.)	21(14.19%)	13(61.9%)	8(38.1%)	
Do you think that alopecia areata is hereditary or acquired?	Acquired	119(80.41%)	71(59.7%)	48(40.3%)	0.19/0.66
	Hereditary	29(19.59%)	16(55.2%)	13(44.8%)	
How long has alopecia areata lasts?	3 months or less	40(27.03%)	24(60%)	16(40%)	4.05/0.54
	6 months or less	32(21.62%)	18(56.3%)	14(43.8%)	
	9 months or less	17(11.49%)	10(58.8%)	7(41.2%)	
	1 year or less	12(8.11%)	10(83.3%)	2(16.7%)	
	More than a year	9(6.08%)	4(44.4%)	5(55.6%)	
	I'm still sick	38(25.68%)	21(55.3%)	17(44.7%)	
Has having alopecia disease affected your quality of life in general? For example (I had to leave the workplace, I had to avoid attending social events?)	Yes	48(33.33%)	24(50%)	24(50%)	2.06/0.15
	No	96(66.67%)	60(62.5%)	36(37.55)	

** p≤0.05,**p≤0.01, ***p≤0.001*

Related diseases

As shown in Table (3) 30.58% reported that infection is the most causes of alopecia areata followed by anxiety by 28.16%, and then Immune disease had 21.84%, and then Depression with 14.56%. 30.90% used Folk remedies for treatment, followed by Medicated topical creams with 24.16%, 8.99% reported without treatment. 66.89% of them had alopecia in scalp part of the body, while 26.35% in the chin, only 3.38% had it in the whole body and other parts of the body each. In term of gender difference, there was a relationship between gender and without treatment with advantage for male (X^2= 6.11,p<0.05,=0.01), also the female reported higher than male in scalp as a part of the body, while male reported higher in chin (X^2= 22.10,p<0.001).

Table 3 Related diseases and gender differences (N=148)

Statement		All	Gender		
			Male	Female	X^2 / p value
Which of the following do you think is one of the causes of alopecia areata?	Infection	63(30.58%)	36(41.4%)	27(44.3%)	12/0.73
	Anxiety	58(28.16%)	28(32.2%)	17(27.9%)	32/0.57
	Immune disease	45(21.84%)	32(36.8%)	26(42.6%)	0.51/0.47
	Depression	30(14.56%)	13(14.9%)	17(27.9%)	3.71/0.054
	Other	10(4.85%)	7(8%)	3(3%)	0.56/0.46
Which way of treatment you use to treat alopecia?	Folk remedies	55(30.90%)	29(33.3%)	26(42.6%)	1.33/0.25
	Medicated topical creams	43(24.16%)	22(25.3%)	21(34.4%)	1.45/0.23
	It still exist	35(19.66%)	18(20.7%)	17(27.9%)	1.02/0.31
	Medical local injection	29(16.29%)	19(21.8%)	10(16.4%)	0.68/0.41
	Without treatment	16(8.99%)	14(16.1%)	2(3.3%)	6.11*/0.01
On which part of the body did you get	Scalp	99(66.89%)	45(45.5%)	54(54.5%)	22.10***/<0.001
	The chin	39(26.35%)	34(87.2%)	5(12.8%)	

alopecia?	The whole body	5(3.38%)	4(80%)	1(20%)	
	Parts of the body	5(3.38%)	4(80%)	1(20%)	

** p≤0.05,**p≤0.01, ***p≤0.001*

The relation between COVID-19 and Alopecia Areata

As shown in Table (4) only 12.16% had diagnosed with Coronavirus 19, and only 11.76% had infected with the Corona virus 19, and not diagnosed with alopecia and then notice hair loss in the period after infestation with COVID19 and diagnosed with alopecia. Only 5.6% reported that did noticed a replace infected with the Corona virus 19, and you are not diagnosed with alopecia, did you notice hair loss in the period after you infected with COVID19 and diagnosed with alopecia. 94.59% had noticed hair loss in the period after receiving the vaccine and was diagnosed with alopecia. Only 9.86% noticed hair loss in the period after receiving the vaccine and was diagnosed with alopecia. And only 4.20% noticed a relapse of alopecia areata during this period.

The results revealed insignificant relationship with gender (p>0.05).

Table 4 History of Coronavirus 19 (N=148)

Statement		All	Gender		
			Male	Female	X^2 / p value
Have you been diagnosed with Coronavirus 19?	Yes	18(12.16%)	13(72.2%)	5(27.8%)	1.53/0.22
	No	130(87.84%)	74(56.9%)	56(43.1%)	
After you were infected with the Corona virus 19, and you are not diagnosed with alopecia, did you notice hair loss in the period after you infected with COVID19 and diagnosed with alopecia?	Yes	2(11.76%)	1(50%)	1(50%)	0.46/0.50
	No	15(88.24%)	11(73.3%)	4(26.7%)	
If you were diagnosed with alopecia areata, after being infected with the Corona virus 19, did you notice a relapse infected with the Corona virus 19, and you are not diagnosed with alopecia, did you notice hair loss in the period after you infected with COVID19 and diagnosed with alopecia?	Yes	1(5.56%)	1(100%)	0	0.41/0.52
	No	17(94.44%)	12(70.6%)	5(29.4%)	
Have you received the Corona 19 vaccine?	Yes	140(94.59%)	83(59.3%)	57(40.7%)	0.23/0.60
	No	8(5.41%)	4(50%)	4(50%)	
After receiving the corona virus 19 vaccine and you were not previously diagnosed with alopecia, did you notice hair loss in the period after receiving the vaccine and was diagnosed with alopecia?	Yes	14(9.86%)	7(50%)	7(50%)	0.48/0.50
	No	128(90.14%)	76(59.4%)	52(40.6%)	
If you were diagnosed with alopecia areata, after receiving the corona virus 19 vaccine, did you notice a relapse of alopecia areata during this period?	Yes	6(4.20%)	5(83.3%)	1(16.7%)	1.65/0.20
	No	137(95.80%)	78(56.9%)	59(43.1%)	

** p≤0.05,**p≤0.01, ***p≤0.001*

General medical history

As shown in Table (5) 38.51% of the first-degree relatives had alopecia areata. 61.28% did not suffer from other disease. Allergic rhinitis was the most disease have they suffered from with 8.55%, followed by Thyroid disease with 7.24% In term of psychiatric disease 81.94% reported did not having any disease, while only 6.94% had social phobia, followed by Generalized anxiety disorder with 6.94%. In term of gender difference, there was a relationship between gender and relatives ever had alopecia areata with advantage for female (X^2= 6.52, p<0.01,=0.004).

Table 5 General medical history (N=148)

Statement		All	Gender		
			Male	Female	X^2 / p value
Have any of your first-degree relatives ever had alopecia areata?	Yes	57(38.51%)	25(43.9%)	32(56.1%)	8.52**/0.004
	No	91(61.49%)	62(68.1%)	29(31.9%)	
Do you suffer from any other diseases?	I do not suffer from any other diseases	93(61.18%)	56(64.4%)	37(60.7%)	0.21/0.65
	Allergic rhinitis	13(8.55%)	7(8%)	6(9.8%)	0.14/0.71
	Thyroid disease	11(7.24%)	5(5.7%)	6(9.8%)	0.87/0.35
	Irritable Bowel Syndrome	10(5.58%)	5(5.7%)	5(8.2%)	0.34/0.56
	Diabetes	8(5.26%)	6(6.9%)	2(3.3%)	0.92/0.34
	Hypertension	6(3.95%)	4(4.6%)	2(3.3%)	0.16/0.69
	Vitiligo disease	5(3.29%)	5(5.7%)	0	3.63/0.057
	Other	3(1.97%)	3(3.4%)	0	2.15/0.14
	Psoriasis	2(1.32%)	0	2(3.3%)	2.89/0.09
Do you suffer from any of the following diseases?	I'm not having any disease	118(81.94%)	73(61.9%)	45(38.1%)	4.80/0.31
	Generalized anxiety disorder	10(6.94%)	3(30%)	7(70%)	
	Social phobia	11(7.64%)	6(54.5%)	5(45.5%)	
	Other	3(2.08%)	1(33.3%)	2(66.7%)	
	Major Depressive disorder	2(1.39%)	1(50%)	1(50%)	

** p≤0.05,**p≤0.01, ***p≤0.001*

4. DISCUSSION

In human body all organs have their specific roles which are performed very well if at molecular level expression of the proteins, hormones and genes in a calculated range. Any imbalance on the molecular/cell level like over or under expression of genes, mutation in gene or addition or deletion in chromosomes affects whole cell signaling of the body. Disturbance in cell signaling also affects five senses of human i.e., sense of smell, taste, touch, hearing and vision. AA is a multifactorial disorder which causes pattern baldness on scalp and other body parts. Although it is not a life threating condition it affects a person physiological health. Research have shown evidences that it is an auto-immune disorder caused by dendritic cells (CD1a+ /CD36+) and lymphocytes (CD4+). Pathway involved in this disease is still unknown (Ghersetich et al., 1996).

In this study, both affected and non-affected residents of Hail were included through an online questionnaire. Results of both groups were compared and data was also examined on the basis of age and gender. More male in comparison with female participated in the present research; major part of participants was between the ages of 21 to 30 years. From participates only 18.21% were either suffering or have history of AA. In 21 to 30 years, incidence of AA was reported more in comparison with 31-40 years. From the affected individuals mostly were self-diagnosed then the diagnosis by doctor. 80% of affected participants stated their AA was acquired rather than congenital. When the data was divided on the basis of gender, AA was more prevalent in males as compared with females. In the younger age group prevalence of AA was more in females than males.

The gender-based results of our study contradicts with the results of another study done in the Al-Taif area of Kingdom of Saudi Arabia (Abd El-Mawla & Maghrabi, 2015). AA prevalence was reported to be same in both the genders according to that study as compared to our study where it is reported to be more prevalent in males in comparison to female population. A reason of

difference between the two studies could be because of number of participants included in the study. Study from Al-Taif included 1600 participants (800 male and 800 female) while in the present study total 813 participants were included (430 male and 383 female). The ratio of male and female participants was also different in both of the studies. Approx. 31% of affected AA individuals reported skin infection as reason of acquired AA while anxiety, Immune disease and Depression were the other reasons reported as the causative agents for this disease. AA is a thoroughly researched auto-immune and long-term inflammatory disease which relation with mental health issues like anxiety and depression had previously been described by the researchers (Altunisik et al., 2022).

From the participated individuals only 12 were diagnosed with COVID-19, and from which 11% had noticed hair loss in the period after infestation with COVID-19 and then they were diagnosed with alopecia. 5.6% of participants reported replace of AA after they were infected with the COVID-19. Approx. 9% of affected AA patients noticed hair loss in the period after receiving the vaccine and was diagnosed with alopecia. Only 4.20% of affected AA patients reported a relapse after receiving vaccine for COVID-19. Immediately after the start of COVID-19 pandemic, researchers started to observe and inspect hypodermal signs/conditions associated to COVID-19 infection. Evidence from both affected individuals and dermatologist suggested a rise in hair loss in recovered patients. It was assumed that experience of physical, mental and physic distress through viral infection may perhaps results in telogen effluvium-like situations which typically are stated after some months of traumatic occurrence (e.g., mental/physic distress, high temperature, etc.). Currently available data is limited on the issue, nonetheless a lot of evidences are presented by community stats otherwise informed through clinical resource (Rinaldi et al., 2021). Though, we were unable to find any research reporting AA relapse in affected COVID-19 patients in Kingdom of Saudi Arabia.

Stress consequent of quarantine situation such as that originating from health and economic uncertainty may perhaps be a triggering/causative agent of AA relapse reported in the present study. Certainly, distress has been stated as an impacting factor on various skin diseases (Garcovich et al., 2020). Thought-provoking research has been done in which inflammation caused from COVID-19 infection has been investigated, since inflammation has a major role in causing Alopecia. Recently, researchers (Bulat et al., 2021) discovered over-activation of T cells in COVID-19 affected individuals, which cause a surge in the subset of CD 4 T cells (Th17). This causes rise in the production of cytokines IL17 and IL22 (interleukin), the core causative factor of cytokine release storm (CRS) which leads to the quick as well as lethal decline of health of COVID-19 patients (Xu et al., 2020).

The statistics in our study presented that there is no significant relapse in patients suffering from AA and infected by COVID-19 and it is more prevalent in males as compared to females. But as there are some limitations of the present study one of which is limited number of participants. Other limitations include no clinical investigations, no molecular and genetic aspects of the disease were considered. In future, a cross-sectional study including people from all over the Saudi Arabia should be done so that the gender prevalence as well as relation of AA with COVID-19 infection and its vaccination could be made clear.

5. CONCLUSION

Prevalence of AA in Kingdom of Saudi Arabia is relatively higher as compared to west. It appears to be more prevalent in younger age group. When compared to other autoimmune conditions, our survey indicates that AA affects males than females in Hail region. Thirty-one percent affected AA reported of having acquired condition rather than congenital. This study also depicts that there are very less chances of AA relapse after infestation with COVID-19 or after receiving vaccine for this virus. A cross-sectional study including individuals from different regions of Kingdom of Saudi Arabia should be done in future so that the gender prevalence as well as relation of AA with COVID-19 infection and its vaccination could be made clear.

Authors' Contributions

All authors share in analyzed and interpreted data, also they have critically reviewed and approved the final draft and are responsible for the content and similarity index of manuscript.

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We thank the patients who were all participated in and contributed samples to the study.

Informed consent

Written informed consent was obtained from all individual who participate in the study.

Ethical approval

The study was approved by the Medical Ethics Committee of Hail University (ethical approval number: H-2022-032).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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