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Original Research Article

Risk profile of non-cicatricial alopecia in females

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ABSTRACT

Background: Non cicatricial alopecia (NCA) is a common dermatological problem in female produces greater psychological distress. Understanding the risk factors and associations is essential for comprehensive assessments and effective management of various forms of hair loss. This study has been conducted with the aim to identify the possible risk profile of different types of NCA in female patients.
Methods: A descriptive type of observational study was conducted to find out the risk profile of NCA in females. About 355 females with NCA attending the outpatient department of dermatology and venereology department, Bangladesh medical university, Bangladesh during study period were the study population. Data was collected through face-to-face interviews and clinical examinations along with laboratory investigations on all patients.
Results: Among 355 female patients of NCA, age, duration of alopecia and family history of alopecia were significantly higher in patients with FPHL in comparison to patchy and diffuse pattern hair loss patients. Patients with diffuse alopecia had statistically significant association ($p \leq 0.001$) with CTD and history of taking OCP, oral steroid and hydroxychloroquine significantly more from the patients with other two patterns of NCA and the blood hemoglobin level was significantly lower in patients with diffuse alopecia.
Conclusions: Diffuse alopecia was the most common type NCA, which was associated with connective tissue diseases (CTD); history of taking OCP, oral steroid and hydroxychloroquine and lower blood hemoglobin level. Age, duration of alopecia and family history of alopecia were significantly higher in patients with female pattern hair loss (FPHL) of NCA.

Keywords: Alopecia, Alopecia areata, Non cicatricial alopecia, Non-scarring alopecia, Female pattern hair loss, Telogen effluvium

INTRODUCTION

Female patients present more frequently with the complaint of alopecia.[1] Different types of alopecia have different treatment protocols. Hence accurate diagnosis and determining the cause of hair loss is mandatory in all cases.[2] Alopecia is prevalent among females, categorized as either cicatricial or non-cicatricial, depending on the potential for hair follicle regeneration.[3] Risk factors and associations play a crucial role in understanding the causes and patterns of hair loss. NCA is common dermatologic problem especially for women.[4] NCA refer to hair loss due to changes in hair cycle, hair follicle size, hair breakage, hair shaft defect or a combination of these, with preservation of the hair follicle. Clinically, NCAs can be classified as focal (patchy), diffuse, or 'patterned'.[5] Patchy NCA encompasses conditions such as alopecia areata (AA), pressure-induced alopecia, tinea capitis, and traction alopecia. Diffuse NCA includes anagen effluvium, loose anagen syndrome, telogen effluvium (TE) and certain subtypes of AA, where loss occurs diffusely across the scalp.[6] Finally, patterned conditions include FPHL and trichotillomania.[3] NCA is a multifactorial disease with various etiological factors. Understanding the risk factors

and associations, such as age, genetics, ethnicity, and certain medications, is crucial for tailoring interventions and providing targeted care. Certain drugs, such as mood stabilizers, antidepressants, anticoagulants, β-blockers, ACE inhibitors, and others, may result in hair loss, particularly through TE. Discontinuation or initiation of oral contraceptives and the use of progesterone-impregnated intrauterine devices can also contribute.[7] Alopecia may be a component of autoimmune systemic disorders such as systemic lupus erythematosus. It is imperative to differentiate between diffuse AA and systemic lupus erythematosus.[8,9] Alopecia remains one of the most common entities that puzzled dermatologists. The best way to alleviate distress is to effectively treat the NCA. Appropriate counseling and treatment can be provided to improve the patient's outcome only when the specific etiology of NCA can be established.[10,11]

For this purpose, exact epidemiological data regarding precipitating factors, co-morbid conditions and consequence of different types of NCA is necessary.[12] By considering these factors and adopting appropriate interventions, individuals and healthcare providers can work together to address alopecia effectively, enhance patient outcomes, and improve overall quality of life for those affected by hair loss.

METHODS

A descriptive type of observational study was conducted from July 2022 to June 2024 in department of Dermatology and Venereology, Bangladesh Medical University, Bangladesh. About 355 females with NCA attending the outpatient department of Dermatology and Venereology, during study period were the study population. Female patient with cicatricial hair loss were excluded from the study. After case selection, both verbal and written consent were obtained from the patient participating in this study. During the recruitment period, the study's objectives were explained to all participants. They were informed that their participation in the study would not only benefit them but also the whole community as well. Data were collected through face-to-face interviews and clinical examinations along with laboratory investigations were done on all patients. A complete clinical examination of patients was performed in good light with special attention on the morphology of each lesion, which included number of alopecic patches, sites of involvement etc. Age, duration of disease, history of atopy, family history of alopecia, history of associated other concomitant diseases like CTDs, diabetes mellitus, thyroid dysfunction, and PCOS of patients were evaluated. Association of drugs like oral contraceptives, oral steroid, hydroxychloroquine, antihypertensive etc. were recorded from patients. Laboratory parameters of patients like hemoglobin level, TSH level, presence of dermatophyte in culture, IgE level, ANA tests etc. also evaluated. A predesigned structured case record form was made as data collection tool, and all data were recorded there.

Data analysis

Data was analyzed with computer software package SPSS (Statistical package for social sciences, version 23). Continuous data were reported as median and itraquartile range (IQR: 25th percentile-75th percentile) as they were not normally distributed. Qualitative or categorical data were described as frequencies and proportions. Proportions were compared using chi-square test of significant association among groups. Kruskal Wallis test was used to determine significant difference of media among groups. Statistical significance was defined as $p<0.05$ and confidence interval was set at 95% level.

Ethical considerations

A consent form was constructed describing the title, objectives, procedure of the study, expected outcome, potential risk to the subject undergoing intervention, and ways to minimize it. These statements were written and described in an easily understandable, clear local language. All patients' information was kept confidential under the principal investigator's responsibility. No other than the investigator, regulatory authorities, and institutional review board (IRB) had access to the collected data. The patient's identity was not disclosed while analyzing or publishing the study results. Ethical clearance for the study was taken from the institutional review board (IRB) of Bangladesh medical university (BMU) before the commencement of this study. Informed written consent was taken from all the participants without exploiting any weaknesses. Privacy, anonymity and confidentiality of data information identifying any patient were maintained strictly. Each patient enjoyed every right to participate, refuse, or even withdraw from the study at any time. Due respect was given to all the patients.

RESULTS

A descriptive observational study was carried out between the periods of July 2022 and June 2024 in the department of dermatology and venereology of Bangladesh medical university to find out the risk profile of NCA in females. The study was carried out with 355 patients' with an average age of 23.61 (SD: 12.01) years. The patchy hair loss pattern (n=171) was the most common subtype of NCA in the study followed by diffuse alopecia (n=144).

Among 355 female patients of NCA, 40 patients had CTD, 13 patients had diabetes mellitus, 8 patients had hypothyroidism, 4 patients had hyperthyroidism and 4 patients had PCOS. All systemic disease especially CTD was significantly more in patients with diffuse alopecia. The association between CTD and diffuse type of NCA was statistically significant ($p\leq0.001$). On the other hand other systemic diseases had no significant association with pattern of NCA.

Age, duration of alopecia and family history of alopecia were significantly higher in patients with FPHL in

comparison to patchy and diffuse pattern hair loss patients. However, history of atopy had no association with pattern of alopecia (Table 1).

Patients with diffuse alopecia had history of taking OCP, oral steroid and hydroxychloroquine significantly more from the patients with other 2 patterns of NCA (Table 3).

Table 4 shows that, median blood hemoglobin level was significantly lower in patients with diffuse alopecia, median serum IgE level was significantly higher in patients with patchy pattern and positive ANA was found significantly higher in diffuse pattern of NCA. Regarding the level of TSH and culture for dermatophyte, there were no significant differences in three groups.

Table 1: Association of demographic and clinical factors with different patterns of NCA (n=355).

Characteristics	Patchy (n=171)	Diffuse (n=144)	FPHL (n=40)	P value
Age (in years)	20 (10-30)	23 (18-28)	35 (21-42)	<0.001†
Duration (months)	4 (2-12)	12 (3-24)	36 (24-81)	<0.001†
H/O of atopy	77 (45.1)	60 (41.9)	18 (45.8)	0.886*
F/H of alopecia	20 (11.8)	23 (16.3)	35 (87.5)	<0.001*

*NCA: non cicatrical alopecia, FPHL: Female pattern hair loss. Data were expressed as median (interquartile range) or frequency (percentage) as appropriate. P values were obtained either from †Kruskal Wallis Test or *Chi-square test.

Table 2: Association of systemic disease with different pattern of NCA (n=355).

Systemic disease	Patchy (n=171)	Diffuse (n=144)	FPHL (n=40)	P value*
CTD	2 (1.0)	35 (24.3)	3 (8.2)	<0.001
DM	3 (2.0)	3 (2.3)	7 (16.8)	0.561
Hypothyroidism	3 (2.0)	3 (2.3)	2 (4.2)	0.845
Hyperthyroidism	2 (1.0)	2 (1.2)	0 (0)	0.845
PCOS	0 (0)	2 (1.2)	2 (4.2)	0.891

*NCA: non cicatricalalopecia, FPHL: Female pattern hair loss, CTD: Connective tissue disease, DM: Diabetes mellitus, PCOS: Polycystic ovarian syndrome. Data were expressed as frequency (percentage). *p values were obtained from Chi-square test.

Table 3: Association of drugs and different pattern of NCA (n=355).

Drugs	Patchy (n=171)	Diffuse (n=144)	FPHL (n=40)	P value*
OCP	8 (4.9)	22 (15.1)	13 (33.3)	<0.001
Oral steroid	0 (0)	34 (23.3)	3 (8.3)	<0.001
Hydroxychloroquine	0 (2.0)	25 (17.4)	3 (8.3)	<0.001
Anti-diabetic	3 (2.0)	3 (2.3)	2 (4.2)	0.542
Anti-hypertensive	2 (1.0)	3 (2.3)	3 (8.3)	0.412

*NCA: non cicatrical alopecia, OCP: Oral contraceptive pill, FPHL: Female pattern hair loss. Data were expressed as frequency (percentage). *p values were obtained from Chi-square test.

Table 4: Laboratory parameters of patients with different patterns of NCA (n=355).

Findings	Patchy	Diffuse	FPHL	P value*
Hemoglobin (gm/dl)	12.0 (11.8-12.5)	11.5 (10.8-12.0)	12.0 (11.8-12.5)	<0.001‡
TSH (IU/l)	1.7 (1.1-2.4)	2.0 (1.2-2.4)	1.9 (1.4-2.3)	0.491‡
Dermatophyte present in culture (n=40)	20 (50.0)	20 (50.0)	0 (0)	0.177*
IgE (IU/l)	202 (86-990)	149 (79-856)	69 (48-153)	0.001‡
Positive ANA (n=43)	2 (3.8)	38 (88.5)	3 (7.7)	<0.001*

*Data were expressed as either Median (IQR) or Frequency (Percentage) as appropriate. P values were obtained either from Chi-square test or ‡Kruskal Wallis test.

DISCUSSION

A wide range of patients of NCA with the mean age 23.61 (±12.01/SD) was recorded in this study. This finding is similar to the result of Aslani et al and Salahudeen et al.[9,10] Fatani et al performed a retrospective review of the female patients with TE and they reported that out of 279 female patients mean age was 29.82 years and 58.5% of the patients were between the age of 21 and 40.[11] Okram et al studied a total of 50 patients with FPHL and majority of the patients were in the age group 18-30 years.[12] In this study, the common pattern of NCA was patchy alopecia 171 (48.1%), followed by diffuse alopecia 144 (40.6%) and FPHL 40 (11.3%). Ravikiran et al explored that the

most common pattern of hair loss was diffuse hair loss in their study.[13] On the other hand, both Aslani et al and Salahudeen et al reported FPHL was the commonest subtypes of NCA.[9,10] This difference could be attributed to the fact that the present study was conducted on female patients only whereas the other two studies were conducted on both male and female patients and due to the socio-economic constraint and cultural difficulties women in general are poorly represented in hospital. Out of 40 patients of FPHL, 35 (87.5%) patients had a family history of alopecia in our study. It was noted that patients with family history had an earlier onset of hair loss as compared to patients without hair loss and indicates genetic susceptibility predisposes to early onset of hair loss reported by Okram et al, Zhang et al and Ravikiran et al explored a positive family history in 51% of patients in their study.[11-14] Okram et al studied a total of 50 patients with FPHL and 38% of them had a positive family history of baldness.[12]

It was noted that atopy and family history of alopecia were the most common associated conditions present in 45.1% and 11.8% patients with patchy alopecia cases respectively in our study. The association between CTD and diffuse type of NCA was statistically significant ($p \leq 0.001$). On the other hand, other systemic diseases like thyroid disorders, diabetes mellitus, PCOS had no significant association with pattern of NCA. Similarly, past research conducted on Asian population has shown that systemic or dermatological conditions were not associated with patchy alopecia specially AA, stated by Singh et al, Lyakhovitsky et al and Lakshminarayana.[15-17]

Majority of patients with FPHL were in the age group of 21-42 years with a median age of 35 years and the median duration of FPHL was 3 years in our study. In a study done by Zhang et al mean age and duration of alopecia were 34.4±10.6 and 4.49±3.76 respectively and in another study done by Deloche et al the values were 34.9±11.1, 4.9±3.9 respectively.[14,18] These findings resemble other international study where Okram et al reported the mean age was 29.22±13.01 years and duration was 2.00±1.88 years.[12] Paik et al and Aslani et al concluded that the prevalence of FPHL increases with advancing age.[19,9] This inconsistency might be due to greater demand for treatment among patients aged 25 years - 40 years by Ramos et al.[20] Like our study finding, Alshahrani et al., reported that the mean disease duration at the time of presentation was 2 months.[21]

Among 355 female patients of NCA in our study, 40 patients had CTD, 13 patients had diabetes mellitus, 8 patients had hypothyroidism, 4 patients had hyperthyroidism and 4 patients had PCOS. Serum IgE level was significantly higher in patients with patchy pattern of NCA. Liu et al in a study observed that Hashimoto thyroiditis 14.3%, was the common comorbidities in the overall cohort of patchy AA in their study and laboratory results indicated that 39.2% had high IgE levels.[22] Alshahrani et al conducted a study with patients with AA and among 216 patients common associated conditions included hypothyroidism, diabetes mellitus, and atopic diseases in their study.[21] Deo et al conducted a study with 135 cases and observed that their cases of alopecia (32, 23.7%) had stress, topical application of chemicals, systemic medications for concurrent illnesses and pregnancy were the common exacerbating factors.[23] Ravikiran et al., observed that Polycystic ovarian syndrome, hypothyroidism and BMI more than 25 (overweight and obesity) were noted in 23%, 15% and 65% of patients respectively.[13] Fatani et al performed a retrospective review of 279 medical records of the female patients with TE. Hypothyroidism was reported in 21.1% of the patients, dermatitis in 11.8%, diabetes mellitus in 5.7%, and bronchial asthma in 3.6%. Low hemoglobin was observed in 94.9% of the patients, low MCH in 99.6%, low hematocrit in 90.21%, serum ferritin was at 630 ng/mL in 64% of the patients and 670 ng/mL in 89.1%.[11] Okram et al studied a total of 50 patients with FPHL and found that low serum ferritin (<10 ng/ml) was associated with Ludwig II, Hamilton-Norwood II and Olsen patterns of hair loss in pre-menopausal women but it was not statistically significant (p=0.066). Only 2 patients (4%) had low thyroid levels.[12] Siah et al explored 210 patients with FPHL and they reported that hypothyroidism and hypertension are the most common medical problems and 71% had ferritin level above 30 µg/l at the first consultation.[24]

This study had a few limitations. Non cicatricial alopecia is a multifactorial disease with various etiological factors. The entire population was selected from a tertiary care hospital in our study, not representative of all females of NCA of Bangladesh; sample size was not large enough to make comments on individual NCA, especially the rare one and histopathological examination of the entire sample was not possible. Future population based prospective studies might be required with relatively larger sample size, multicenter involvement, to further characterize different pattern, prevalence, clinical features, risk factors and treatment response of individual NCA among females of Bangladesh.

CONCLUSION

Diffuse alopecia was the most common type which was associated with several co-morbidities. Among diffuse pattern of NCA, majority had CTDs; history of taking OCP, oral steroid and hydroxychloroquine and lower blood hemoglobin level. Age, duration of alopecia and family history of alopecia were significantly higher in patients with FPHL of NCA. To design treatment effectively, underlying causes and risk factors of NCA should be evaluated.

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