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Factors associated with traction alopecia in women living in Yaoundé (Cameroon)

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Abstract

Background Traction alopecia (TA) is very common in Africa but few studies on African population are available. We sought to determine factors associated with TA and measure the association between these factors and TA.

Methods We carried out an analytical cross-sectional study in 29 hairdressing saloons in the city of Yaoundé. A questionnaire was administered and scalp exams were performed in order to look for TA and determine Marginal TA severity score if present. Participants were separated in two groups: TA group and a group without TA.

Results We finally included 223 women (77 having TA and 146 without TA). The median age was 26 years for women with TA and 24 years for women without TA. The factors associated with traction alopecia we found included: age ≥ 35 years (adjusted OR=4; $p=0.016$). Hairdressing undertaken by hairdressers only (adjusted OR=0.2; $p=0.008$), the avoidance of the regular use of nets, caps and head ties (OR=0.2; $p=0.006$) and relaxing hairs once a year or less (adjusted OR=0.2; $p=0.005$) could be protective factors. As well, we found a positive correlation between age and TA severity ($r=0.235$; $p<0.001$).

Conclusion Age and some haircare practices are associated to TA occurrence in our context. Women therefore need to be educated on these various factors that could be able to cause, worsen or prevent TA.

Keywords Traction alopecia, Hairstyles, Associated factors, Women, Yaoundé

Background

Alopecia is defined as a partial or total hair loss whatever the cause. This pathology can occur in individuals of all ages, races or genders. Alopecia represents a frequent

complaint in dermatology clinic [1]. The main mechanisms leading to alopecia are : hair shaft defects, alteration of the hair shaft's cycle (telogen effluvium, anagen arrest), destruction of hair follicles and miniaturization of the follicle [2].

Alopecia is broadly classified in two groups: scarring (i.e., cicatricial) and nonscarring alopecia. Scarring alopecia are characterized by an irreversible destruction of the hair follicle. Scarring alopecia can result from a primary disease of the hair follicle (primary alopecia) or can be secondary to another process (secondary alopecia) [3, 4]. Nonscarring alopecia do not affect the hair follicle. They are divided into traumatic and nontraumatic alopecia. Traumatic alopecia include: compression, compulsion, twitch alopecia and traction alopecia (TA) [5].

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TA is localised traumatic nonscarring alopecia which affects almost exclusively people of African descent [6]. TA in absence of treatment evolves to definitive hair loss. The main factors associated with TA found in literature are : old age, the regular use of traumatic hairstyles (ponytails, tight braids, extension use...), hairdressing symptoms (pimples, crusts, pain), the combined use of hair dyes and chemical hair relaxers, heat processing of relaxed hair [6–8]. Afro hair (due to its characteristics) and chemical relaxation of the hair make them more susceptible to chronic mechanical trauma [6].

However, though TA is not fundamentally associated to morbidity, this pathology is responsible of an aesthetic prejudice. This prejudice induces a major psychological impact that alters considerably the quality of life of these patients [1, 9]. Therefore, prevention is crucial, based on factors which could induce, worsen or delay the onset of TA [10]. Yet, very few studies have been carried out on this topic, particularly in African individuals. Thus, this study aimed to determine factors associated with TA and measure the association between these factors and TA.

Methods

Design and site of the study

We carried out a descriptive and analytic cross-sectional study during 7 weeks as from the 07th June to the 21st July 2020 in 29 hairdressing salons (23 classic saloons and 6 high class saloons) in the town of Yaoundé. Since we didn't have an exact estimation of the number of hairdressing saloons present in the town of Yaoundé, saloons were chosen randomly in each of the 7 subdivisions in Yaoundé. A classic saloon/high class saloon ratio was not defined.

We have defined Classic saloon as a saloon which offers hairdressing as main service and which sells hair accessories; and High-class saloon as saloon offering in addition to hairdressing, body care, nail care, massage etc.

The minimal sample size was 171 participants and given by the formula below:

$$n = \frac{t^2 \times p \times (1 - p)}{m^2}$$

N: minimal sample size for statistically significant results.

T: 1.96 for a confidence interval of 95%.

P: traction alopecia's prevalence in women 31.7% [11].

m²: standard error 0.07.

Our target population was women living in Yaoundé and our source population was made of women visiting hairdressing saloons in the town of Yaoundé. Women aged of at least 18 years present in a hairdressing saloon during our visit and that gave their informed consent were included in our study. Exclusion criteria were: an

incomplete interview, hairdressing abstention for at least five years and hairstyles limiting the scalp margins visualisation.

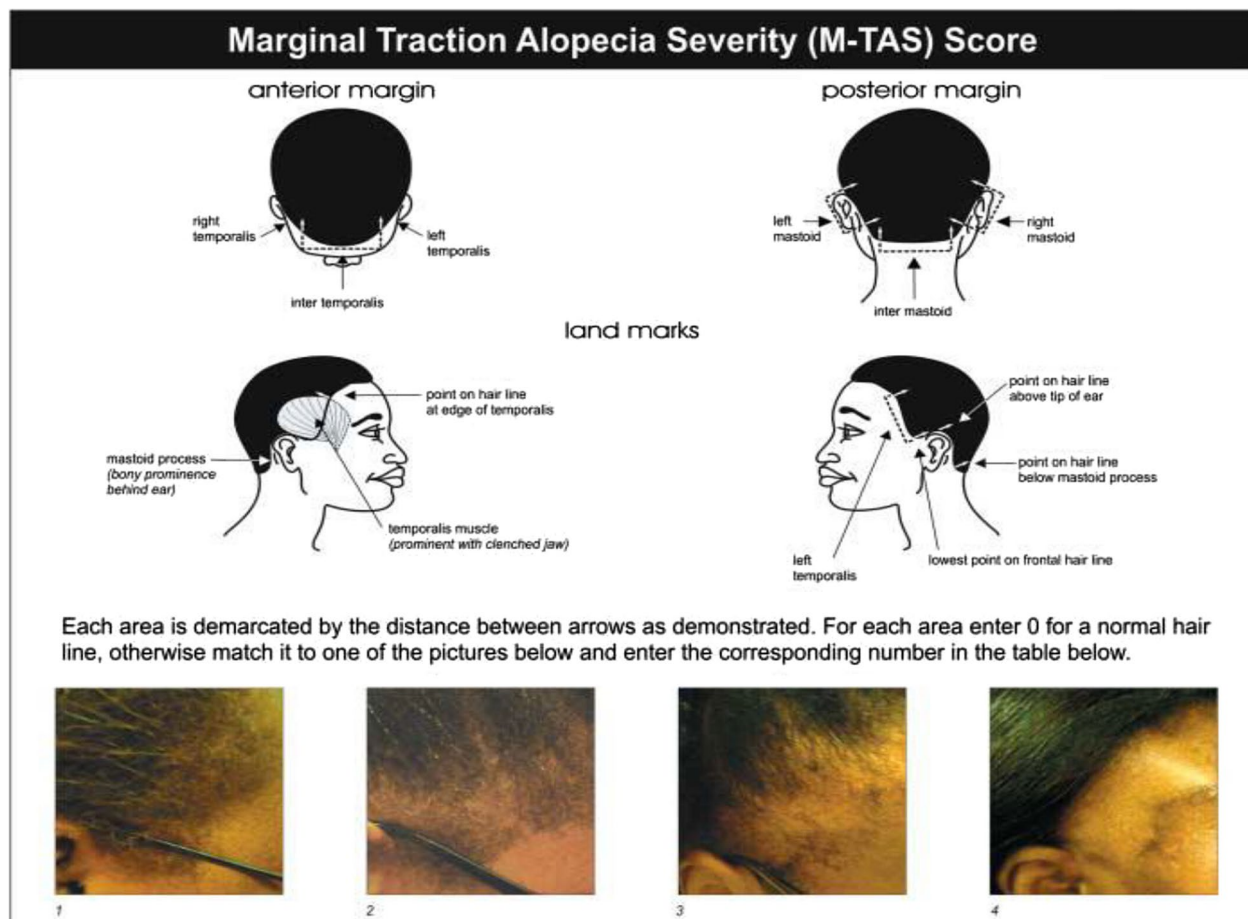
Data collection procedure

Before going on the field, ethical approval was obtained from the Institutional Committee for Ethics and Research of the Faculty of Medicine and Biomedical Sciences of The University of Yaoundé I. Subsequently, verbal authorizations were given by the administrative authorities of the various subdivisions as well as the different hairdressing saloon owners selected for our study.

We built a single team for data collection. Hairdressing saloons were visited one time. Once the team arrived in a hairdressing saloon, the object of the study was presented to every potential participant and the consent to participate to the study was requested. Then, a preconceived and pretested questionnaire was given to those who agreed to participate to our study. Each participant was filling the form under the supervision and with the help of the investigator. The questionnaire was globally made of sociodemographic data (age, profession, monthly income, native region) and the various haircare practices (grooming habits hair relaxing and hair hygiene). Then a scalp examination was performed inside the hairdressing saloon in a space allocated for this exercise. In order to achieve this, the examiner inspected the participants' scalp and then palpated the hairs in order to appreciate their density. The scalp margins were separated in anterior and posterior margins by an imaginary line joining both tragi.

As a reminder, the medial edges of the temporal muscles divide the anterior margin in three areas: left temporalis, right temporalis and inter temporalis. Temporal muscles were palpated easily by asking the participant to clench both jaws. The posterior margin is also divided in three areas: left mastoid, right mastoid and inter mastoid by both mastoid prominences [11]. Data relative to each region's examination were directly reporter on the data collection form. The picture grid of the Marginal Traction Alopecia Severity Score (M-TAS) proposed by Khumalo et al. (Fig. 1) was used to research and evaluate TA [12]. When the examination was normal, the zero score was given meaning absence of TA. Otherwise, when alopecic areas or scarcity of hairs were detected, the severity was appreciated with the picture grid of the questionnaire in order to quote a score between 1 and 4. The score of each area was summed in order to obtain a total. The M-TAS ranges from zero to 24 and is interpreted as follows [11]:

- **M-TAS = 0:** no traction alopecia.
- **1 ≤ M-TAS ≤ 3:** mild traction alopecia.



Each area is demarcated by the distance between arrows as demonstrated. For each area enter 0 for a normal hair line, otherwise match it to one of the pictures below and enter the corresponding number in the table below.

Fig. 1 Tool for marginal traction alopecia score evaluation

- $4 \leq \text{M-TAS} \leq 6$: moderate traction alopecia.
- $\text{M-TAS} > 6$: severe traction alopecia.

At the end of this process, a counselling was made to all the participants of our study on TA and preventive measures. As well, a counselling was made on the behavioural changes relative to hair hygiene and haircare.

Data analysis

Data collected were digitized with the software Epi Info version 7.2.5 and analysed with the software IBM SPSS version 25. Quantitative data were represented by their median and interquartile range (IQR). The average ages of the group with TA and the group without TA were compared using the U Mann-Whitney test. Qualitative data were represented in terms of number and proportions. Qualitative data were compared with the Chi² test or the Fischer exact test when the conditions for Chi² test were not filled. A *p-value* < 0.05 was considered as statistically significant. A binomial logistic regression was used to research factors associated to TA. For analysis

purposes, ages have been merged into age groups. The association was represented by the adjusted odds ratio and the 95% confidence interval. Data with a *p-value* < 0.2 in univariate analysis as well as variables acknowledged as favouring TA (hairstyle, hair relaxation frequency) were integrated in the multivariate model. For multivariate analysis, we used a step-by-step model in including at the beginning variables and excluding them progressively if *p* > 0.1 at each step. The association between the participants' age and the M-TAS was evaluated with the Spearman correlation test. Tables were realised with the software Microsoft Office Excel version 2020.

Ethical and administrative considerations

The research was carried out in the respect of the 4 fundamental principles of Helsinki declaration on human research. Before inclusion in the study, each participant was informed on the advantages and the constraint relative to our study. Each participant of the study gave her informed consent. Participation to our study was free and any refusal did not lead to consequences. Our research

proposal was submitted and approved by the Institutional Committee for Ethics and Research of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I for research approval and authorization (Reference No: 346/UY1/FMSB/VDRC/DAASR/CSD).

Results

For this study, among 265 recruited, we finally included 223 participants; we identified 77 women with TA and 146 without TA (Fig. 2).

The median age was 24 years with an interquartile range [21; 27 years] and another range from 18 to 55 years. For the TA group, the median age was 26 years with an interquartile range [22; 33 years] and a range from 18 to 55 years. The median age for the group without TA was 24 years with an interquartile range [21; 26 years] and a range from 18 to 40 years. The most represented age group was the one of participants aged from 18 to 24 years (Table 1).

Sociodemographic factors

The TA group was older than the group without TA with a statistically significant difference ($p < 0.008$). Participants under 35 years old were mostly affected. Thus, the TA group had a lower level of education compared to that of the group without TA ($p < 0.001$), (Table 1).

Factors related to hair grooming habits

All the women of the TA group used extensions to groom their hairs, a proportion statistically superior to the one of the disease-free women ($p=0.013$), (Table 2). The proportion of women with TA which had their hairstyles done by a hairdresser or a family member / friend that didn't have hairdressing training was statistically inferior to the proportion found in disease free women ($p=0.004$). On the other hand, the regular use of nets, caps and head ties was less common in the group without

Table 1 Distribution of the sociodemographic characteristics in TA group and the group without TA

Characteristics N=223	TA n=77 (%)	No TA n=146 (%)	p-value
Age			
Mean	28.5	24.3	
Median [IQ]	26 [22.5 ;33]	24 [21; 26]	0.0001
Minimum	18	18	
Maximum	55	45	
Region of origin			
Farnorth/North/Adamoua	2 (2.6)	4 (2.7)	
Centre/South/East	28 (36.4)	68 (46.6)	0.557
Littoral/Southwest	13 (16.9)	21 (14.4)	
West/Northwest	34 (44.1)	53 (36.3)	
Level of education			
Primary	8 (10.3)	3 (2.1)	
Secondary	16 (20.8)	15 (10.3)	0.001
Higher	53 (68.8)	128 (87.6)	
Profession			
Hairdresser	9 (11.7)	7 (4.8)	0.058
Others	68 (88.3)	139 (95.2)	

TA compared to the TA group; this disparity was statistically significant ($p=0.036$), (Table 2).

The age at the first use of extensions was similar in both groups (Table 3).

Factors related to chemical and thermal treatments

The proportion of women with TA that used chemical hair relaxers was statistically higher than in women without TA ($p < 0.001$) (Table 4).

The age at the first chemical hair straightening was similar in both groups. Meanwhile, the annual frequency of hair relaxation was significantly higher in the TA group compared to the group without TA ($p < 0.001$). The

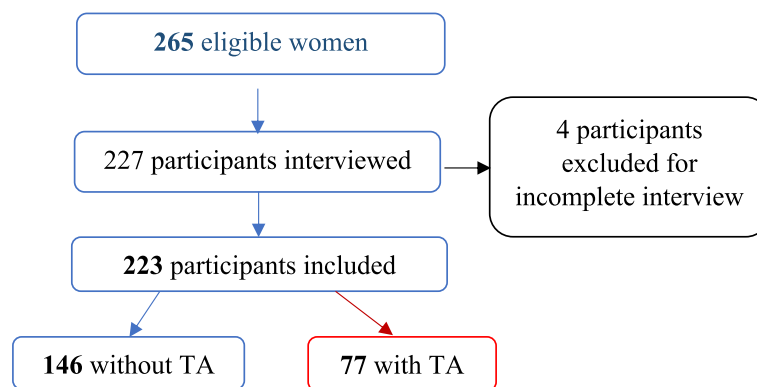


Fig. 2 Flowchart of the participants enrolment

Table 2 Distribution of hair grooming habits among the TA group and the group without TA

Characteristics <i>N</i> = 223	TA <i>n</i> = 77 (%)	No TA <i>n</i> = 146 (%)	<i>p</i> -value
Type of hairstyle			
Hairstyles with extension	77 (100)	135 (92.5)	0.013
Hairstyles without extension	0 (0)	11 (7.5)	
Hair grooming frequency			
< 3 weeks	28 (36.4)	53 (36.3)	0.993
≥ 3 weeks	49 (63.6)	93 (63.7)	
Hair grooming provider			
Family member / friend who is not hairdresser	6 (7.8)	17 (11.6)	0.004
Hairdresser	59 (76.6)	124 (84.9)	
Both	12 (15.6)	5 (3.4)	
Wig cap use			
Yes	42 (54.5)	89 (55.4)	0.355
No	35 (45.5)	57 (44.6)	
Hairdressing related symptoms frequency			
Always	8 (10.4)	12 (8.2)	0.438
Sometimes	23 (29.9)	56 (38.4)	
Rarely/never	46 (59.7)	78 (53.4)	
Hair brushing			
Yes	44 (57.2)	87 (59.6)	0.724
No	33 (42.8)	59 (40.4)	
Head tie/cap/net use			
Yes	72 (93.5)	122 (83.6)	0.036
No	5 (6.5)	24 (16.4)	
Hair shaving			
Yes	65 (84.4)	112 (76.7)	0.176

Table 3 Distribution of both groups according to the age at the first use of extensions

Characteristics <i>N</i> = 223	TA <i>n</i> = 77 (%)	No TA <i>n</i> = 146 (%)	<i>p</i> -value
Age at the first use of extensions			
Before 10 years	40 (53.4)	87 (59.6)	0.237
After 10 years	37 (46.6)	59 (40.4)	
Age at the first wig use			
Before 15 years	8 (10.4)	22 (15.1)	0.365
After 15 years	69 (89.6)	124 (84.9)	

proportion of women with TA whose hair was relaxed by themselves or by a family member was statistically higher than in the group without TA ($p=0.001$) (Table 4).

Women of the TA group used hair dyes, hairdryer and heat iron more often than the disease-free women but the difference was not significant (Table 4).

Factors related to hair hygiene

The hair washing frequency was similar in both groups. The majority of participants irrespective of the group used shampoo to wash their hair (Table 4).

Correlation between age and traction alopecia's severity

The scatter plot representing the Marginal Traction Alopecia Severity Score (M-TAS) according to the participants' age shows a moderate, positive and linear relationship between these two variables (Fig. 3). The bivariate correlation however showed a positive but weak relationship between age and the M-TAS ($r=0.235$; $p<0.001$). The equation was $M-TAS=0.148(\text{age})-2.044$.

Multivariate analysis

On multivariate analysis, we found that women aged of 35 years and above were 4 times more susceptible to

Table 4 Factors related to hair treatment and hygiene

Hair straightening process and use of chemical and thermal treatment in both groups			
Characteristics N=223	TA n=77 (%)	No TA n=146 (%)	p-value
Chemical hair relaxation			
Yes	77 (100)	119 (81.5)	<0.001
No	0 (0)	27 (18.5)	
Age at the first hair relaxation			
Before 10 years	16 (20.8)	20 (13.7)	0.172
After 10 years	61 (79.2)	126 (86.3)	
Hair relaxation / year			
No more than once	11 (14.2)	64 (43.8)	<0.001
2–3 times	38 (49.4)	60 (41.1)	
> 3 times	28 (36.4)	22 (15.1)	
Hair straightening provider			
Family member	15 (19.5)	21 (14.4)	0.001
The participant	9 (11.7)	9 (6.1)	
Hairdresser	53 (68.8)	89 (61.0)	
Nobody	0 (0)	27 (18.5)	
Burns after relaxation			
Never/Rarely	41 (53.2)	82 (56.2)	0.139
Sometimes	23 (30)	52 (35.6)	
Often/always	13 (16.8)	12 (8.2)	
Characteristics N=223 TA n=77 (%) No TA n=146 (%) p-value			
Hair dye use			
Yes	32 (41.6)	50 (34.2)	0.282
No	45 (58.4)	96 (65.8)	
Heat treatment			
Yes	64 (88.3)	105 (71.9)	0.063
No	13 (16.9)	41 (28.1)	
Hair hygiene of participants			
Characteristics N=223 TA n=77 (%) No TA n=146 (%) p-value			
Hair washing/month			
No more than once	39 (50.6)	81 (55.5)	0.492
At least twice	38 (49.4)	65 (44.5)	
Hair washing product			
Shampoo	55 (71.4)	113 (77.4)	0.326
Others	22 (28.6)	33 (22.6)	
Hair oil			
Natural oil	22 (28.6)	46 (31.5)	0.203
Manufactured oil	23 (29.9)	26 (17.8)	
Both	31 (40.2)	70 (47.9)	
None	1 (1.3)	4 (2.7)	

develop TA compared to women aged between 18 and 24 years ($p=0.016$). Though the probability of TA reduced with the level of education, this result was not statistically significant. The profession was not associated to TA (Table 5).

Women whose hairstyles were exclusively done by a qualified person seemed less prone to have TA than those whose hairstyles were done both by a hairdresser and untrained persons (adjusted OR=0.2; $p=0.008$). Also, women that do not regularly wear nets, caps and head ties were 5 times less susceptible to develop TA ($p=0.006$). The frequency of hairdressing related symptoms did not expose to TA (Table 6).

Women relaxing their hair once in a year or less frequently were 5 times less subject to TA than those who relaxed twice or thrice a year (adjusted OR=0.2; $p=0.005$). The age at the first hair chemical straightening was not associated to TA (Table 6).

Discussion

TA is a common disease but still less studied particularly in Africa. The aim of our study was to research factors associated with TA occurrence in women living in Yaoundé. We found that factors associated with TA were: age, hair style provider, the use of head ties, caps and nets and the annual frequency of chemical hair relaxation.

Concerning the sociodemographic factors, we found that participants with TA were older than patients without TA. This result aligns with study by Dadzie and Salam in 2015 in United Kingdom [13].

An age of 35 years or above increased by 4 folds the probability of developing TA ($p=0.016$). Hence, there was a positive correlation between age and M-TAS, though this correlation was weak. Age was also identified by Dadzie et al. (OR=1.04 ; $p<0.001$) [13]. In fact, hair reach their growth peak at the age of 30. After this age, there is a diminution of the hair shaft's diameter and a reduction of hair density ; hairs also become dryer [14]. These modifications are exacerbated by the use of hair dye and the use of flat iron [15]. Given this fragility of hairs with age, reducing aggressive treatment on them (chemical straightening, hair dryer or heat iron use) could contribute to reduce the occurrence of TA.

Women that usually use extensions for their hair grooming develop TA more than women who did not use them. In fact, causality between TA and hairstyles that chronically put in tension the hair shaft (dreadlocks, wigs, braids) is established [8, 16]. Extensions are natural or synthetic additives used in order to increase the size or the length of the hair [17]. Though extensions make hairstyles daily maintenance easy, they impose an additional charge to afro hair that is relatively fragile and less extensive; this favouring hair breakage. Moreover, women of Afro-descent prefer hairstyles with extensions because they a be kept for longer periods [18]. Yet, the weight and the duration of wearing of these extensions also favour TA occurrence [10]. Extensions also exert a permanent and one direction traction on hairs. This could lead to

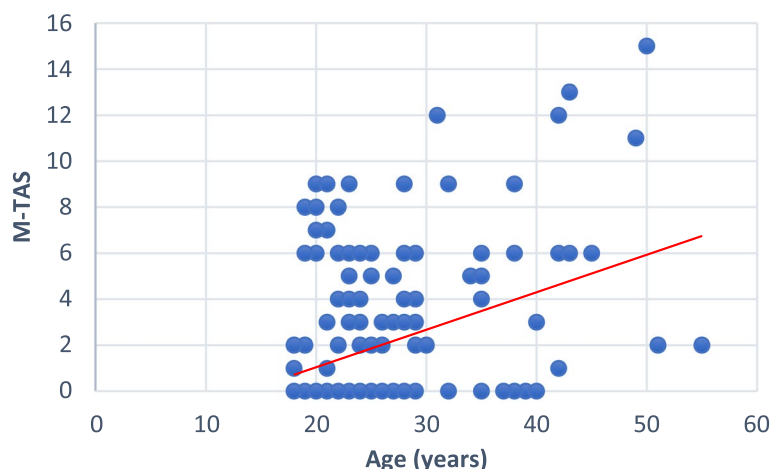


Fig. 3 Scatter plot showing the relationship between the M-TAS and participants' ages

Table 5 Sociodemographic characteristics of participants on multivariate analysis

Characteristics N=223	TA n=77 (%)	No TA n=146 (%)	OR (95% CI)	p-value
Age group				
18–24 years	37 (48.1)	86 (58.9)	1	
25–34 years	23 (29.8)	49 (33.6)	1.3 (0.6–2.8)	0.484
35–55 years	17 (22.1)	11 (7.5)	4.1 (1.3–12.9)	0.016
Level of education				
Primary	8 (10.4)	3 (2.1)	1	
Secondary	16 (20.8)	15 (10.3)	0.6 (0.1–3.1)	0.503
Higher	53 (68.8)	128 (87.6)	0.4 (0.1–2.3)	0.316
Profession				
Hairdresser	9 (11.7)	7 (4.8)	2.8 (0.5–14.5)	0.214
Others	68 (88.3)	139 (95.2)	1	

and important rupture of hair shafts when added to hairs initially fragilized [19, 20]. A measure to avoid TA could consist of sensitising women in order for them to reduce the length and the volume of extensions, as well as the duration of their hairstyles. Also, hairstyles without extensions should be proposed as alternative solution particularly to women above 35 years old.

We did not find an association between hairdressing related symptoms and TA like other studies reported [8, 10, 13]. This could be due to the fact that majority of women in the present study rarely had such symptoms during hairdressing or asked the hairdresser to loosen their braids.

Women whose hairstyles were done only by a hairdresser were 5 times less susceptible to develop TA compared to women whose hairstyles were done both by a hairdresser and an untrained person ($p=0.008$). Dadzie and Salam found that women having their hair grooming undertaken by a friend / family member with formal

hairdressing training and qualifications were at risk of developing Alopecia [13]. We can presume that subjects with effective hair loss feel more comfortable to have their hair grooming by a family member rather than visit a hairdressing saloon where privacy is not always present; the friend/family member may be trained but don't have all the appropriate equipment; which can lead to a vicious circle. Therefore, the requirement of professional services (qualified person in a well-equipped milieu) for hair grooming could help preventing TA in women. Also, hairdressers should be more sensitised on TA and retrained on the haircare and manipulation of « afro » hair.

Regular use of caps, nets and head ties was more common in TA group compared to the group without TA. We found that avoiding such accessories reduced by 5 times the probability of TA (adjusted OR=0.2; $p=0.006$). The regular use of tied buns has already been presented in Literature as a factor influencing TA's onset [8]. These accessories are generally worn tightly and exerting traction on hairs. Moreover, women using them have their hair done before wearing those accessories. Religious or cultural motivations could also justify the regular use of various beauty accessories; it is the case for Sikh religion adepts who wear a head tie (turban) constantly. They later on develop TA [6, 21]. Nevertheless, even if the role of caps in TA onset is not firmly established; few studies like the one of Billero and al. found that localized alopecia was present in seven nurses whom attached cap to the scalp [6]. Our study globally evaluated the frequent use of these accessories. It seems necessary and appropriate that further studies should be carried out on the subject to enlighten this problematic. However, it could be judicious to educate women on the adequate use of these accessories particularly head ties and nets which seem very used by afro descent women.

Table 6 Factors related with hair grooming habits and hair chemical treatment on multivariate analysis

Factors related with hair grooming habits after multivariate analysis				
Characteristics N= 223	TA n= 77 (%)	No TA n= 146 (%)	OR (95% CI)	p-value
Hair grooming provider				
Family member / friend who is not hair-dresser	6 (7.8)	17 (11.6)	0.3 (0.5–1.5)	0.138
Hairdresser	59 (76.6)	124 (84.9)	0.2 (0.0-0.6)	0.008
Both	12 (15.6)	5 (3.4)	1	
Head tie/cap/net use				
No	5 (6.5)	24 (16.4)	0.2 (0.0-0.6)	0.006
Yes	72 (93.5)	122 (83.6)	1	
Hairdressing related symptoms				
Always	8 (10.4)	12 (8.2)	1	
Sometimes	23 (29.9)	56 (38.4)	0.7 (0.2–2.5)	0.638
Never/rarely	46 (59.7)	78 (53.4)	0.5 (0.2–1.9)	0.340
Factors related with chemical hair treatment after multivariate analysis				
Characteristics N= 223	TA n= 77 (%)	No TA n= 146 (%)	OR (95% CI)	p-value
Age at first hair relaxation				
Before 10 years	16 (20.8)	20 (13.7)	0.8 (0.3–1.9)	0.617
After 10 years	61 (79.2)	126 (86.3)	1	
Hair relaxation/ year				
No more than once	11 (14.3)	64 (43.8)	0.2 (0.1–0.6)	0.005
2–3 times	38 (49.3)	60 (41.1)	0.4 (0.4-1.0)	0.550
>3 times	28 (36.4)	22 (15.1)	1	
Bruns after relaxation				
Never/rarely	41 (53.2)	82 (56.2)	0.6 (0.2–1.9)	0.423
Sometimes	23 (30)	52 (35.6)	0.4 (0.1–1.3)	0.123
Often/always	13 (16.8)	12 (8.2)	1	

Hair relaxation was the main chemical hair treatment used by women presenting TA. A frequency of hair straightening equal to once a year or less could be a protective factor from TA (adjusted OR=0.3; $p=0.025$). Rucker et al. also found an increasing risk of TA with chemical hair relaxant's use [22]. In fact, hair straightening products destroy the monomolecular layer of fatty acid covalently bound to the cuticle. This hydrophobic layer retards water from wetting and penetrating the hair shaft and changing its physical properties [23, 24]. Thus, the relaxed hair is porous and less resistant to traction than the natural « afro » hair [20]. The cysteine residues of relaxed hair shafts are reduced; meanwhile cysteine is a component of disulfuric bonds that contribute to hair rigidity [25]. This result could also mean that it is long term damages caused by hair relaxation that are deleterious for hairs. Given that hair relaxation is combined to other haircare practices namely extensions use, the risk of TA is bigger [8, 10, 19]. Sensitisation on the deleterious effect of hair relaxers on hairs, « afro » hair promotion and valorisation campaigns through media and especially social media, women sensitization on the

good practices and the norms of usage of hair relaxer and increasing taxes on hair relaxers are several measures to restrict relaxers use and lessen TA in these women.

The earliness of the first chemical treatment was not associated to TA in our study. To our knowledge, there is no study that determined the relation between early onset of hair straightening and TA. But we did not collect the exact age at which the first chemical hair relaxation was done. It was then difficult to exclude an association between these two entities. That is why further research needs to be done to better explore the relation between both entities.

Limits of the study

Our study could present some limits, namely the fact that: (i)- Covid-19 pandemic considerably reduced our data collection period; (ii)- our study could present an information bias since data collected were relative to anterior exposures; (iii)- some data collected could be subjective; and (iv)- hairdressing saloons though chosen randomly, the sample obtained could not be representative of the town's population. Nevertheless, this study is primer for further studies on the subject at a larger scale.

Conclusion

Our study found an association between TA and socio-demographic indicators and haircare practices. Afro descent women (Black women) should be informed on the susceptibility to develop TA which increases with age. The value of « afro » hair must be restored to afro descent women. Women should be sensitised on the long-term noxious effects of some haircare practices and alternatives should be proposed to these women in order to adopt less aggressive haircare practices for their hair. Cosmetics use must be done respectfully of the norms and code of good practices. In order to better understand and prevent TA, further studies should be carried out to research other predictive factors of TA's severity.

Acknowledgements

We thank administrative, medical and paramedical teams of the various participant recruitment sites. Our thanks also go to patients.

Authors' contributions

EAK conceived the study. LFMN collected and entered the data. GNT and LFMN analyzed the data. EAK, DNT, SMM, MFAA and OBS drafted the manuscript. All authors proofread and corrected the manuscript. All authors agreed with the final manuscript to be submitted for publication.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Availability of data and materials

All data relevant to the study are included in the article. No additional data available, all data relevant to the study are included in the article.

Declarations

Ethics approval and consent to participate

The research was carried out in the respect of the 4 fundamental principles of Helsinki declaration on human research; we have obtained an ethical clearance from the Ethics and Deontology Committee of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I (Reference No: 346/UY1/FMSB/VDRC/DAASR/CSD).

Each participant of the study gave her informed consent.

Consent of publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 1 November 2022 Accepted: 17 October 2023

Published online: 08 November 2023

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