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ORIGINAL ARTICLE

A Comparative Assessment of Designs of Hairline Patterns in Patients Undergoing Hair Transplant

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ABSTRACT

Background: Hair loss affects millions of people globally by generating psychological distress together with a diminished sense of self-confidence. Modern hair transplant surgery presents patients with an established means to achieve natural hairline recovery. Improper hairline design results in aesthetically displeasing pluggy appearance which leads to psychological distress among patients.

Materials and Methods: A comparative cross-sectional study was conducted from January 2022 to September 2022. In this study, a total of 100 patients was recruited by using random non-convenient sampling method after obtaining prior written informed consent from all the study participants. In this study, all the patients undergoing hair transplant due to androgenic alopecia, age-related alopecia and alopecia due to scarring were included.

Results: A total of 50 patients were recruited for the study with the mean age of 33.82 + 4.99 years of age. Post transplantation, degree of hair fall and hairline pattern was also assessed using Norwood Hamilton scale and it was observed that hairline pattern improved significantly as explained in table 3 and up till grade 4 it was noticed that all the patients reverted back to the type 1.

Conclusion: The research delivers significant information about hairline styles as well as transplantation performance assessment at a tertiary care center located in Balochistan Pakistan. Most patients benefited from their hair transplant procedures by showing substantial development in their hairline patterns according to lower Norwood-Hamilton grade assessments after treatment.

Keywords: hair transplant, alopecia, androgenic, hairline patterns,

INTRODUCTION

Hair loss affects millions of people globally by generating psychological distress together with a diminished sense of self-confidence[1]. Modern hair transplant surgery presents patients with an established means to achieve natural hairline recovery[2]. A hair transplant procedure depends mostly on the hairline design rather than technical aspects between follicular unit extraction (FUE) and follicular unit transplantation (FUT) methods. The result of the procedure depends heavily on the combination of shape with density and symmetry in the transplanted hairline while this outcome depends on multiple elements like facial structure and age along with patient preferences and gender characteristics[3].

Advanced hair restoration techniques have allowed medical professionals to develop more sophisticated knowledge about ideal hairline planning methods. The early hair restoration methods delivered artificial-looking and linear hairlines as well as sharp-defined edges that stood out as unnatural from natural hair growth patterns[4]. Current hair restoration techniques focus on natural elements through irregular features and smooth junctions that recreate the authentic hairline. Multiple factors must be understood by surgeons when designing hair transplant surgery because they impact how the frontal hairline sits and how the density distribution changes towards the back and the way temporal recessions add aging sophistication[5]. Choosing a hairline design surpasses being a technical step because it demands both artistic expertise along with a full comprehension of facial aesthetics[2,4].

The classification of hairline patterns includes straight lines together with slightly curved lines and M-shaped designs as well as irregular patterns[6]. Selection of patterns in hair restoration depends on different factors unique to each patient. The selection process for a hairline pattern depends on patient age where younger patients choose straight or slightly curved lines for younger appearance yet older patients pick receded or M-shaped styles for older age-appropriate looks[7]. The evaluation of hair transplant hairline designs includes studies about graft placement strategies as well as graft density allocation along with the use of solitary follicular units to generate a softened hairline appearance[8]. Improper hairline design results in aesthetically displeasing pluggy appearance which leads to psychological distress among patients who may require additional surgeries to correct the issue and data for patients undergoing hair transplant about hairline patterns is lacking for local populace of Pakistan. Therefore, this study is warranted for the assessment of designs of hairline patterns in patients undergoing hair transplant in Pakistan and especially in Balouchsitan.

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MATERIALS AND METHODS

A comparative cross-sectional study was conducted at the department of plastic surgery of Bolan Medical Complex and Teaching Hospital Quetta from January 2022 to September 2022 for the assessment of hairline patterns in patients undergoing hair transplant with the age range of 20 to 50 years of age after approval from institutional review board under the guidelines of Hilinski Declaration. In this study, a total of 100 patients was recruited by using random non-convenient sampling method after obtaining prior written informed consent from all the study participants. In this study, all the patients undergoing hair transplant due to androgenic alopecia, age-related alopecia and alopecia due to scarring were included while the patients having alopecia due to trauma, alopecia aerate and alopecia universalis were excluded from the study.

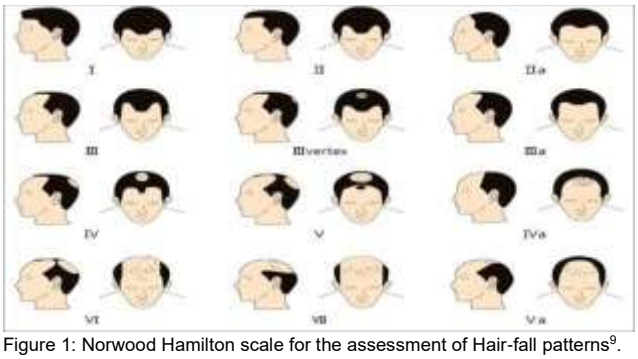

Figure 1: Norwood Hamilton scale for the assessment of Hair-fall patterns[9].

Detailed sociodemographic data including age, gender, smoking, educational background, ethnicity and marital status

were recoded. For the assessment of hair fall pattern Norwood-Hamilton scale (9) was employed as explained in figure 1 and hair type was recorded accordingly. Post-assessment of hair-fall type, patients were subjected for hair transplant under aseptic conditions, patients were subjected to local anesthesia subcutaneously with mild oral sedation. Sterile and disposable instruments were used and donor site was harvested in prone position and site was closed using non-absorbable sutures and transplantation was performed and no of the grafts implanted were recorded.

Statistical Analysis: Anonymized data was entered into Microsoft Excel version 2019 and was dully compared for errors and omissions and after cross-verification data was imported to Statistical Package Software for Social Sciences (SPSS) version 26.0. Frequencies and percentages of qualitative variables were assessed and data was presented into bar charts and pie charts. Classification types were assessed using chi-square test for study parameters and no of grafts were compared in each type by using one-way ANOVA which were further compared by using post Hoc Tukey analysis to determine group differences. A p-value of 0.05 was regarded as significant.

RESULTS

A total of 50 patients were recruited for the study with the mean age of 33.82 + 4.99 years of age. Patients were assessed for smoking and it came out 22 % of study participants (n=11) were smokers and 82% had family history of alopecia while 18% did not have any previous family history of alopecia. 60% of the study subjects were married and 52% were doing exercise regularly as explained in table 1. On the assessment of educational level, it was observed that 8% were undergraduate, 32 percent had graduation, 40 percent had masters degree and rest 20 percent had post-graduation.

Table 1: Assessment of Educational and Personal Profile of Study Participants.

Study Parameter	N	%
Smoking	11	22
Exercise	26	52
Married	30	60
Family history of Alopecia	41	82
Graduation	14	32
Masters	20	40
Post Graduation	10	20
Undergraduate	4	8

Assessment of grade of pattern baldness and hairline pattern was done using Norwood Hamilton scale and patients were categorized as explained in figure 1 and it was observed that majority of the patients had type 3 and above hair fall patterns suggesting a greater degree of baldness in study population.

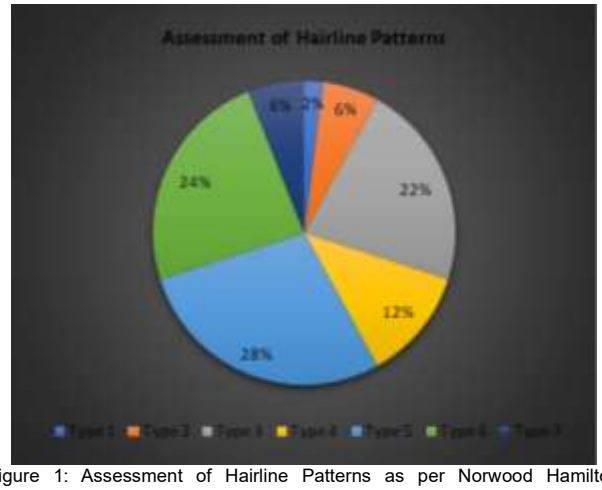

Figure 1: Assessment of Hairline Patterns as per Norwood Hamilton Classification in Patients undergoing Hair Transplant

Number of grafts used in the hair transplant in each type of alopecia explained by Norwood Hamilton classification were compared using one way Anova and it was observed that with increasing severity of hair loss, a change in hairline pattern is observed which leads to the more no of required grafts to cover the loss with a p-value of 0.0001.

Table 2: Assessment of Hairline Patterns and Number of Grafts used in Patients undergoing Hair Transplant.

Harline Pattern Type	Grafts Used	P-value
	Mean + Std. Dev	
Type 1	3000.0000 + 0	0.0001
Type 2	3500.0000 + 300	
Type 3	4218.1818 + 572	
Type 4	5600.0000 + 1000	
Type 5	5850.0000 + 515	
Type 6	6808.3333 + 290	
Type 7	5900.0000 + 964	

Post transplantation, degree of hair fall and hairline pattern was also assessed using Norwood Hamilton scale and it was observed that hairline pattern improved significantly as explained in table 3 and up till grade 4 it was noticed that all the patients reverted back to the type 1. But in grade 5, 6 and 7 it was noticed that majority of patients post transplant were falling in grade 2 explaining successful post transplant results in hairline patterns.

Table 3: Assessment of Chi-Square Association of Hair Transplant in Pre and Post Transplant Baldness Grade.

Pretransplant Baldness Grade	Post Transplant Baldness Grade (n,%)			Pearson chi-square	Pearson R	p-value
	Grade 1	Grade 2	Grade 3			
Grade 1	1 (100)	0	0	44.394	0.714	0.0001
Grade 2	3 (100)	0	0			
Grade 3	10 (91)	1 (9)	0			
Grade 4	5 (83)	1 (17)	0			
Grade 5	2 (14)	12 (86)	0			
Grade 6	2 (17)	10 (83)	0			
Grade 7	0	2 (67)	1 (33)			

DISCUSSION

This study examined hairline patterns among hair transplantation patients in Balochistan's tertiary healthcare facilities of Pakistan. Advanced stages of baldness were observed among most patients whose severity matched Norwood-Hamilton type III and beyond therefore requiring a larger number of grafts to achieve successful hairline restoration. Research from previous literature shows androgenetic alopecia causes significant mental impacts which reduce patients' self-image and social comfort level[12]. The research data indicates that 82% of patients considered alopecia to be hereditary in their family similarly to established genetic factors in male pattern baldness[13]. Multiple studies have linked the smoking lifestyle habit with worsening hair loss severity because 22% of survey participants admitted to it[14].

The results of our study mirror findings from other regional and international cohorts. Advanced alopecia patients need

complex planning methods according to Gupta et al. for creating natural hairlines with optimal density and graft survival outcomes[15]. Patient popularity for Norwood types V–VII requires substantially increased graft utilization which shows that extensive balding demands detailed surgical organization. The research places special emphasis on the altered appearance of hairlines for patients after hair transplantation. Medical procedures returned patients with baldness grades I to IV to primarily restore their hair status as Norwood grade I. The patients with grades V–VII mostly obtained grade II results from their hair transplant procedures. The research findings validate past studies showing that extensive baldness from donor limitations makes it challenging to achieve authentic juvenile hairlines[16,17]. The success of patient treatment requires experienced advice about possible results since it helps control their expectations.

Modern improvements in surgical methods have strengthened the desire for natural hairlines with suitable aging appearances. The creation of modern hairlines now goals for irregular feathered edges instead of traditional linear designs which produces a natural appearance[18]. The study incorporates artistic core elements of density graduation alongside temple recession and facial symmetry which correspond with contemporary hair restoration surgery consensus statements[19]. The approach highlights customization because facial shape and ethnic characteristics together with individual age need to guide which hairline designs doctors choose.

The observed graft placement technique which places individual follicular units in the front zone and uses clustered units in the rear zone matches accepted industry standards[20,21]. This strategy creates a gentle edge along the hairline and produces enough density in the posterior region as it is essential for patients with low donor hair opportunities. The surgery successfully enhanced hairline pattern following the operation according to researchers (p=0.0001). Patient satisfaction rates following proper integration of artistic principles match those observed in the meta-analysis conducted by Trueb et al.[22]. The process of hair restoration encounters continued difficulties among people who carry advanced degrees of baldness. The limited donor area availability in grades V–VII patients prevented full restoration to juvenile hairlines even after transplantation procedures. The findings of Gkrintzalis et al. support that severe alopecia restoration should aim to frame the face and attain acceptable density rather than reaching total scalp coverage[23].

Aesthetic concerns about hairlines strongly depend on ethnic identity of individuals. The study participants originating from Balochistan show unique facial features that affect the best placement of their hairlines. Literature suggests that various ethnic groups have specific hair anatomical features and preferential choices so healthcare requires individualized treatments[24]. Multiple strengths emerge from this study which includes specific research methodology coupled with standardized Norwood-Hamilton classification tools along with statistical reinforcement. One must recognize several restrictions affecting the study. The limited generalization of results occurred because the research studied only 50 participants at a single medical center. Future research should focus on both final graft success and long-term aesthetic results after surgeons implement the LiTAS cutting technique for earlobe reduction surgery.

CONCLUSION

The research delivers significant information about hairline styles as well as transplantation performance assessment at a tertiary care center located in Balochistan Pakistan. Most patients benefited from their hair transplant procedures by showing substantial development in their hairline patterns according to lower Norwood-Hamilton grade assessments after treatment. Proper outcome expectations counseling should take place for patients with severe hair loss because it is a critical component of treatment success. Multi-center studies with extended patient follow-up and larger participant numbers should happen to confirm these results and develop modern operative planning techniques for hair transplantation surgery.

REFERENCES

1. Sirinturk S, Bagheri H, Govsa F, Pinar Y, Ozer MA. Study of frontal hairline patterns for natural design and restoration. Surg Radiol Anat. 2017 Jun;39(6):679-684. doi: 10.1007/s00276-016-1771-1.
2. Kim HJ, Baek JH, Lim YR, Kim JH, Yang SM, Koh JS, Oh SM, Shin MK. An analysis of shapes and location of anterior hairline in Asian men. Arch Dermatol Res. 2023 Jul;315(5):1233-1239. doi: 10.1007/s00403-022-02505-1.
3. Bao Y, Wu K, Lin J, Chen Y, Wu W. Study on Hair Distribution in Healthy Males for Hair Restoration Design. J Craniofac Surg. 2018 Nov;29(8):e785-e790. doi: 10.1097/SCS.0000000000004765.
4. Nishat M, Latif A, Humayun A, Irshad F, Ahmad A, Ansar A. Frontal Hair Line - An important landmark for a successful hair transplant. PJMHS. 2018; 12(4): 1362-63.
5. Qu Q, Miao Y, Guo ZH, Feng CB, Chen Q, Liu Y, Liu F, Shi PL, Cao DX, Hu ZQ. Types of hairline recession in androgenetic alopecia and perceptions of aging in Asian males. Int J Dermatol. 2019 Oct;58(10):1191-1196. doi: 10.1111/ijd.14423.
6. Rodman R, Sturm AK. Hairline Restoration: Difference in Men and Woman-Length and Shape. Facial Plast Surg. 2018 Apr;34(2):155-158. doi: 10.1055/s-0038-1636905.
7. Shapiro R, Shapiro P. Hairline design and frontal hairline restoration. Facial Plast Surg Clin North Am. 2013 Aug;21(3):351-62. doi: 10.1016/j.fsc.2013.06.001.
8. Bernstein RM, Rassman WR. The aesthetics of follicular transplantation. Dermatol Surg. 1997 Sep;23(9):785-99. doi: 10.1111/j.1524-4725.1997.tb00419.x.
9. Norwood OT. Male pattern baldness: classification and incidence. South Med J. 1975 Nov;68(11):1359-65. doi: 10.1097/00007611-197511000-00009. PMID: 1188424.
10. Ahmad M. Patient satisfaction in hair transplant surgery. J Pak Assoc Dermatol [Internet]. 2016Dec.24 [cited 2025Apr.6];19(1):9-12. Available from: https://www.jpad.com.pk/index.php/jpad/article/view/501
11. Abbas RZ, Saleem J, Iqbal UJ, Saqlain Z, Ishaq M, Raza A. Prevalence of Hair Loss among Men and its Association with Smoking and Stress: A Case Study in the City of Lahore, Pakistan. PJMHS. 2021;15(6):1439-42. DOI: https://doi.org/10.53350/pjmhs211561439
12. Cash TF. The psychological effects of androgenetic alopecia: a review of the research literature. Br J Dermatol. 2020;182(4):791-799.
13. Pirastu N, Joshi PK, de Vries PS, et al. GWAS for male-pattern baldness identifies 71 susceptibility loci explaining 38% of the risk. Nat Commun. 2017;8(1):1584.
14. Shin H, Ryu HH, Yoon J, et al. Smoking and male pattern baldness: a cross-sectional study. Br J Dermatol. 2021;185(5):968-975.
15. Gupta M, Mysore V. Classifications of Patterned Hair Loss: A Review. J Cutan Aesthet Surg. 2016;9(1):3-12.
16. Kim JH, Kim JY, Park SH, et al. Evaluation of patient satisfaction after hair transplantation: A multicenter study. Dermatol Surg. 2018;44(5):669-676.
17. Pathomvanich D. Donor Harvesting: Follicular Unit Transplantation. Facial Plast Surg Clin North Am. 2018;26(3):301-310.
18. Unger WP, Shapiro R. Hair Transplantation. 6th ed. CRC Press; 2019.
19. Nirmal B, Somiah S. Hairline design: Pearls and pitfalls. Indian J Plast Surg. 2020;53(1):5-12.
20. Rose PT, Parsley WM. Microscopically dissected grafts in hair transplantation. Dermatol Clin. 2021;39(1):57-65.
21. Jimenez F, Ruifernández JM. Distribution of human hair in follicular units: A mathematical model for estimating the donor size in follicular unit transplantation. Dermatol Surg. 2021;47(3):310-315.
22. Trueb RM, Dias MFRG. Male-Pattern Baldness: Current Treatment Strategies. Drugs. 2018;78(9):911-920.
23. Gkrintzalis K, Meyer-Gonzalez T, Hatzis J, et al. Restoration Strategies for Advanced Baldness: A Review. Aesthet Surg J. 2019;39(11):NP457-NP465.
24. Vance BS, Rodriguez ED. Hair Transplantation for Ethnic Hair Types: Review and Recommendations. Aesthetic Plast Surg. 2020;44(2):376-383.

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