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COMPARISON OF AUTOLOGOUS NONCULTURED MELANOCYTE SUSPENSION VERSUS FOLLICULAR UNIT EXTRACTION (FUE) IN TREATMENT OF STABLE VITILIGO.

Dermatology

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ABSTRACT

Background: Vitiligo is a common form of localized depigmentation, defined as an acquired condition resulting from the progressive loss of melanocytes. Surgical treatment is indicated in stable disease not responding to medical treatment. Present study was aimed to compare outcome of autologous noncultured melanocyte suspension versus Follicular Unit Extraction (FUE) in treatment of stable vitiligo at a tertiary hospital. **Material and Methods:** Present study was single-center, comparative, observational study, conducted patients of age > 18 years, either gender, with vitiligo stable for 1 year, underwent autologous melanocyte transfer or follicular unit extraction. **Results:** In present study, 24 patients of stable vitiligo were enrolled. Majority patients were from the age group of 18-25years (62.5 %) & mean age of patients was 26.27± 5.99 years ranging from 18 years till 45 years. Out of 24 patients, 15 (62%) were females and 9 (37.5 %) were males. There was a positive family history of vitiligo in 16.67 % patients. Majority of the patients (62.5 %) were unmarried. The leucotrichia was seen in 29.17 % patients. Majority of the patients (45.83 %) had involvement of face and neck followed by lower extremity (29.17 %), trunk (12.5 %) and upper limbs (12.5 %). 58.33 % of patients were of localized type of vitiligo type, followed by acral (29.17%) and segmental vitiligo (12.5 %). Both group AMT & group FUE showed Excellent response in 66.67 % patches while good repigmentation was seen in both group AMT & group FUE in 33.33 % patches Immediate complications like secondary infection at Donor site was seen in 1 patient (8.33 %) & late complication like hyperpigmentation was seen in 1 patient (8.33 %). **Conclusion:** Surgical methods of treatment for stable vitiligo such as autologous melanocyte transfer or follicular unit extraction, obtained was excellent & good repigmentation.

KEYWORDS

Surgical treatment, stable vitiligo, autologous melanocyte transfer, follicular unit extraction

INTRODUCTION

Vitiligo is a common form of localized depigmentation, defined as an acquired condition resulting from the progressive loss of melanocytes. Vitiligo is found to occur in 1% of the world's population.[1] Based on some dermatological outpatient records, it is roughly estimated to be between 3 to 4% in India although an incidence as high as 8.8% has also been reported.[2] There exists a slight female preponderance in most series based on outpatient's attendances, but the frequency in the population is probably the same in both sexes. Between 30 to 40% patients have a positive family history.[3]

Vitiligo is characterised by milky white, sharply demarcated macules.[4] The outcome of this disorder is often unpredictable and uncertain. The etiopathogenesis of vitiligo is incompletely understood. Various hypotheses for the pathogenesis of the disease by different researchers have been proposed.

Various therapeutic options for repigmentation of vitiligo are available including corticosteroids, calcineurin derivatives and phototherapy. Surgical treatment is indicated in stable disease not responding to medical treatment. Current noncultured melanocyte suspension is a type of cellular grafting which involves separation of different cellular components of a split-thickness skin graft.[5,6] While, use of follicular unit extraction (FUE) method for preparation of non cultured melanocyte suspension, proportion of melanocyte are more. Present study was aimed to compare outcome of autologous noncultured melanocyte suspension versus Follicular Unit Extraction (FUE) in treatment of stable vitiligo at a tertiary hospital.

MATERIAL AND METHODS

Present study was single-center, comparative, observational study, conducted in department of Dermatology, Venerology & Leprosy, at Tertiary care center. Study duration was of 1 years 11 months (August 2020 to July 2022). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Patients of age > 18 years, either gender, with vitiligo stable for 1 year & willing to participate in present study

Exclusion criteria

- Patients with history of bleeding disorders or on anti-coagulant medications (aspirin, warfarin, heparin)
- Patients with active infection at the local site
- Patients with keloidal tendency
- Patients with history of recurrent Herpes labialis.
- Patients positive for HIV and HBsAg.
- Pregnancy

Patients were screened at preliminary visit for stability of lesion. Patient related details such as age, sex, address, history (duration, site of onset, no. of lesions, speed of spread, stability: precipitating factor, associated systemic diseases, any H/O spontaneous repigmentation: previously taken treatment, family history/ past history/ personal history/ menstrual history was noted. findings of general & systemic examination, clinical assessment of patient (site, size, leucotrichia, mucosal involvement, Koebner phenomenon, type of vitiligo) were noted.

Hematological and biochemical investigations (complete hemogram, random blood sugar: liver function test, pregnancy test: BT/ CT/ PT, renal function test, HIV, HBsAg) were carried out in all the patients. Informed written consent was obtained from each and every patient after having carefully explained to them the nature of the treatment with possible results, possible side effects and other modalities of treatment available.

The patients were randomly divided into 2 groups by computer generated chits into

1. Group AMT – Autologous Melanocyte Transfer (Nonculture Suspension)
2. Group FUE – Follicular Unit Extraction (FUE)

All patients received premedication as a prophylactic course of Capsule Amoxicillin Clavulanic acid (625 mg) thrice daily started 1 day before the procedure till 7-day post-procedure. Tab. Ibuprofen 400 mg BD and Tab. Famotidine 20 mg BD was started from the day of procedure till 7-day post-procedure.

Autologous Melanocyte Transfer :

After the preparation of donor site under proper aseptic conditions, blisters were raised using a 20 ml syringe and three way cannula. The syringes act as suction cup. Their needle ends were attached to three-way cannula. Suction was attempted by means of other 20 ml syringe

which is attached to other end of three way cannula. Vacuum was retained by locking the suction syringe end of three-way cannula. Once the desired pressure of 250 to 300 mm of Hg was attained, the suction syringe end was locked. The graft was harvested using iris scissors which cut blisters at margin. The tissue was transferred to a Petri dish containing 6 ml of 0.25% trypsin-EDTA solution with the help of a pair of forceps and incubated for 45 minutes to 2 hrs at 37°C. The epidermis was separated and cut into tiny pieces by the help of a small surgical knife and the entire content was transferred into a centrifuge tube and 3 ml of MK culture medium was added, centrifuged at 5000 rpm for 6 minutes. The supernatant was removed and the pellet was taken out with a pipette. The donor site was dressed using Mupirocin cream, dry gauze pieces and surgical cannulae. After proper sterilization and anaesthesia of the recipient site, it was dermabraded using manual dermabrader until uniform pinpoint bleeding points was seen all over area. The area was abraded 1 to 2 mm beyond the existing margin. After proper hemostasis, the dermal side of the graft was placed on dermabraded recipient site followed by use of Liquid Paraffin dressing, dry gauze pieces and was pressure dressed using elastic adhesive bandage.

Folliclar Unit Extraction (fue):

On the day of surgery, the donor area over occipital or vertex part of the scalp is trimmed to 1–2 mm length. The patient lies in the prone position on the operating table. Local anaesthesia with Xylocaine, 1% diluted with saline, is administered slowly over the entire donor area. The grafts are then extracted from the donor area with the help of 1 mm special micropunches. The micropunch is introduced in the donor area along the direction of follicle. At the same time, counter traction is applied to facilitate the penetration of the punch inside the dermis. The graft is obtained with the help of forceps. The extracted grafts are then preserved in cool Ringer's lactate solution. The extracted graft may consist of 1 to 4 hairs. At the recipient site, after cleaning with Betadine and Spirit and after injecting 1% lignocaine intradermally, slit are made in the direction of follicle with the help of 18 Gauge needle. The extracted grafts are introduced in, slit at recipient site. The donor site was dressed using Mupirocin cream, dry gauze pieces and surgical cannulae.

Post Operative Care:

The patient was advised to keep the recipient site immobile for the next 72 hrs & to continue oral and topical antibiotics for next 7 days. Topical Mupirocin cream was given after removal of first dressing. Follow up examination was done at 7 days, 15 days ,1 month then every month for 6 months. After 15 days patients were advised to apply topical Mometasone furoate 0.1% cream in the morning and topical tacrolimus 0.03% at night.

Reviews were done every 2 weeks and clinical photographs were taken on preoperative, 2 months and 6 months. The endpoint selected was 6 months post procedure or the repigmentation whichever was earlier. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

In present study, 24 patients of stable vitiligo were enrolled. Majority patients were from the age group of 18-25years (62.5 %) & mean age of patients was 26.27± 5.99 years ranging from 18 years till 45 years. Out of 24 patients, 15 (62%) were females and 9 (37.5 %) were males. There was a positive family history of vitiligo in 16.67 % patients. Majority of the patients (62.5 %) were unmarried. The leucotrichia was seen in 29.17 % patients.

Table 1- General characteristics

	No. of patients	Percentage
Age groups (in years)		
18-25	15	62.5 %
26-35	7	29.17 %
36-45	2	8.33 %
Mean age (years)	26.27 ± 5.99	
Gender		
Male	9	37.5 %
Female	15	62.5 %
Other characteristics		
Positive Family history	4	16.67 %
Marital status - Unmarried	15	62.5 %
Leucotrichia present	7	29.17 %

Majority of the patients (45.83 %) had involvement of face and neck followed by lower extremity (29.17 %), trunk (12.5 %) and upper limbs (12.5 %).

Table 2: Site of involvement

Site of involvement	Group AMT	Group FUE	Total
Face and neck	3 (25 %)	4 (33.33 %)	7 (29.17 %)
Trunk	2 (16.67 %)	1 (8.33 %)	3 (12.5 %)
Upper extremity	1 (8.33 %)	2 (16.67 %)	3 (12.5 %)
Lower extremity	6 (50 %)	5 (41.67 %)	11 (45.83 %)

58.33 % of patients were of localized type of vitiligo type, followed by acral (29.17%) and segmental vitiligo (12.5 %).

Table 3: Type of vitiligo

Type of vitiligo	No. of patients	Percentage
Focal (Localized)	14	58.33 %
Acral	7	29.17 %
Segmental	3	12.5 %

Grades of repigmentation

Grade of repigmentation		Area of repigmentation
Poor	+	0-25%
Fair	++	25-50%
Good	+++	50-75%
Excellent	++++	76-90%

In group AMT, excellent repigmentation was seen in 8 vitiligo patches (66.67 %), out of which 4 were on Lower Limb while 2 on Trunk, 1 on face & 1 on lower limb. Good repigmentation was seen in 4 vitiligo patches (33.33 %); out of which 2 patches were on lower limb and 2 were on Face and Neck.

Table 4: Results in different regions in group AMT

Site of involvement	Face and neck	Trunk	Lower limb	Upper limb	Total
Excellent (++++)	1 (8.33 %)	2 (16.67 %)	4 (33.33 %)	1 (8.33 %)	8 (66.67 %)
Good (+++)	2 (16.67 %)	0	2 (16.67 %)	0	4 (33.33 %)

The excellent repigmentation on 8 vitiligo patches (66.67 %), out of which 3 were on face and neck region particularly scalp, 3 on lower limb, 1 was on Upper Limb while 1 was on leg. The Good repigmentation was seen in 3 vitiligo patches (33.33 %) having 2 patches on lower limb & 1 on face & neck.

Table 5: Results in different regions in group FUE

Site of involvement	Face and neck	Trunk	Upper limb	Lower limb	Total
Excellent (++++)	3 (25 %)	1 (8.33 %)	1 (8.33 %)	3 (25 %)	8 (66.67 %)
Good (+++)	1 (8.33 %)	0	1 (8.33 %)	2 (16.67 %)	4 (33.33 %)

In present study, both group AMT & group FUE showed Excellent response in 66.67 % patches while good repigmentation was seen in both group AMT & group FUE in 33.33 % patches

Table 6: Comparative evaluation in different groups

	Group AMT	Group FUE
Excellent (++++)	8 (66.67 %)	8 (66.67 %)
Good (+++)	4 (33.33 %)	4 (33.33 %)
Fair (++)	0	0
Poor (+)	0	0

In present study, immediate complications like secondary infection at Donor site was seen in 1 patient (8.33 %) & late complication like hyperpigmentation was seen in 1 patient (8.33 %). Other complications such as perigraft halo, achromic fissure were not observed.

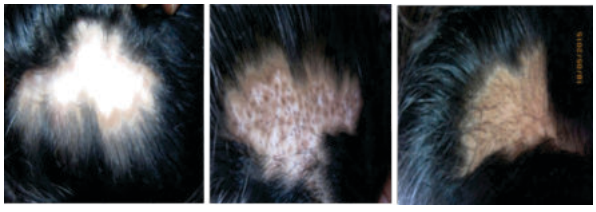
Table 7- Complications

Complications	Group AMT
Secondary infection	1 (8.33 %)
Hyperpigmentation	1 (8.33 %)

Pre- Operative

AT 2 Months AT 6 Months

Figure 1 -Autologous Noncultured Melanocyte Suspension



Pre- Operative AT 2 Months AT 6 Months

Figure 2 -Follicular Unit Extraction (FUE)

DISCUSSION

Cellular grafting techniques include transplantation of non-cultured basal cell-enriched epidermal suspension (NCES), extracted hair follicle outer root sheath suspension (EHF-ORS) and cultured melanocytes (CM) or cultured epidermis (CE). The major advantage of non-cultured and culture-expanded cellular grafts is that they permit the treatment of the affected area many folds larger than the donor area. However, culture techniques employed for the expansion of the cell number are time consuming, expensive, and also require trained manpower and well-equipped tissue culture laboratory. When body surface area involved is larger, then Autologous melanocyte transfer is done as smaller amount of graft can give repigmentation over large area.

Majority patients were from the age group of 18-25years (62.5 %) patients were in the age group of 18-25years. This finding is comparable with age range observed by Kaushik Lahiri et al.,[7] where majority of the patients were in the age group of 16-25 years. Mean age of patients 26.27± 5.99 years which was comparable to the study by Shah and Marfatia et al where the mean age was 22.8 ± 4.8 years.[8]

In present study, 20 (61%) were females and 13 (39%) were males. This shows a definite female preponderance signifying major cosmetic concerns among females seeking more treatment. The findings regarding sex distribution are in accordance with observation of Shah and Marfatia et al.,[8]

There was a positive family history of vitiligo in 13.79 % patients. Majority of the patients (60.6%)were unmarried. This implicates that vitiligo is still a social stigma and patients seeking the treatment are majorly eligible bachelors. The leucotrichia was seen in 27.27 % patients. In Shah H Mehta[1], leucotrichia was present in 43.5 % patients. 58.33 % of patients were of localized type of vitiligo type, followed by acral (29.17%) and segmental vitiligo (12.5 %). This observation was also made by Tawade YU et al.,[9] which showed majority were localized (75.5%).

In group AMT, excellent repigmentation was seen in 8 vitiligo patches (66.67 %), out of which 4 were on Lower Limb while 2 on Trunk, 1 on face & 1 on lower limb. Good repigmentation was seen in 4 vitiligo patches (33.33 %); out of which 2 patches were on lower limb and 2 were on Face and neck. Biju Vasudevan et al.,[10] showed in the Autologous Melanocyte Transfer group, 52% patches showed excellent repigmentation, Good repigmentation was seen in 10 % patches. This shows that the results obtained in our study were comparable with Biju Vasudevanet al.,[10] study.

In present study, excellent repigmentation on 8 vitiligo patches (66.67 %), out of which 3 were on face and neck region particularly scalp, 3 on lower limb, 1 was on Upper Limb while 1 was on leg. The good repigmentation was seen in 3 vitiligo patches (33.33 %) having 2 patches on lower limb & 1 on face & neck. In study by S. Sacchidanand *et al*.,[11] perifollicular repigmentation around the grafted hair was observed in 71% patients. This shows that the results obtained in our study were comparable with S. Sacchidanandet al.,[11] study.

In present study, immediate complications like secondary infection at Donor site was seen in 1 patient (8.33 %) & late complication like hyperpigmentation was seen in 1 patient (8.33 %). Niti Khungeret al.,[12] also noted that hyperpigmentation is commonly seen in AMT group of patients particularly on the exposed areas in dark-skinned patients.

Limitations of present study were, small sample size, which might have led to biased results. Because of high cost of solution used for Autologous Melanocyte Nonculture suspension & non-affordability of charges for FUE, more number of patients could not be enrolled for the procedure.

CONCLUSION

Surgical methods of treatment for vitiligo constitute an important adjuvant to medical therapy. In cases of stable vitiligo underwent surgical procedures aa autologous melanocyte transfer or follicular unit extraction, repigmentation obtained was excellent & good. Proper case selection based on the determination of stability of the lesion is very important. Proper patient counselling about the nature of the disease and the surgery is essential

Conflict of Interest: None to declare

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