LITERATURE REVIEW

1. **Yoshiyuki Sakai, et al., 2001** performed hair-reconstitution assays in nude mice and observed normal hair follicle morphogenesis, regardless of the VDR status of the keratinocytes and dermal papilla cells. However, follicles reconstituted with VDR-null keratinocytes demonstrated a defective response to anagen initiation. Hence, alopecia in the VDR-null mice is due to a defect in epithelial-mesenchymal communication that is required for normal hair cycling. Our results also identify the keratinocyte as the cell of origin of the defect and suggest that this form of alopecia is due to absence of ligand-independent receptor function.

2. **Kalpesh Gaur, et al., 2009,** suggested that the hydro-alcoholic extract of *Hibiscus rosa sinensis* Linn. was found to possess significant immunostimulatory action on immune system but ethanolic extract of *Cleome gynandra* Linn. exhibited significant immunosuppression effect in dose dependent manner when compare with control group.

3. **O.S. Kwon et al., 2007,** suggested that EGCG stimulates human hair growth via its proliferative and antiapoptotic effects on DPCs, and may prolong anagen stage. The effects of EGCG on different hair follicle cell types and the molecular basis for its promotion of hair growth remain unclear and require further investigation.

4. **R.K. Roy et al., 2007,** concluded from the study that hair growth initiation time was significantly reduced to half on treatment with the petroleum ether extracts compared with untreated control animals. The time required for complete hair growth was also considerably reduced. The treatment was successful in bringing a greater number of hair follicles (>70%) to anagenic phase than standard minoxidil (67%). The result of treatment with 2 and 5% petroleum ether extracts were comparable with the standard minoxidil.

5. **Shirode, D et al., 2005,** suggested the hair growth activity of *Hibiscus rosa-sinensis* & *Glycyrrhiza glabra* were evaluated in albino rats. The extract of *Hibiscus rosa-sinensis* (petroleum ether & benzene extract) & *Glycyrrhiza glabra* (alcohol Extract) respectively 0.2%w/v & 2%w/v exhibit maximum hair growth activity as compared to standand group animals as treated with minoxidil solution( 2%w/v).

6. **Kabyashi, N et al., 1993,** found the Effects of 70% ethanolic extract from leaves of *Ginkgo biloba* (GBE) on the hair regrowth in normal and high butter diet-pretreated C3H strain mice
which posterior hair shaved were investigated. GBE showed a promoting effect on the hair regrowth. GBE had the inhibitory effects on blood platelet aggregation, thrombin activity and fibrinolysis. GBE inhibited the increase of serum the triglyceride level in high cholesterol diet-treated rats. These results suggested that GBE promotes the hair regrowth and could be used as a hair tonic.

7. Takahashi T et al., 1998, studied the profile of the active fraction of the proanthocyanidins was elucidated by thiolytic degradation and tannase hydrolysis. We found that the constitutive monomers were epicatechin and catechin; and that the degree of polymerization was 3.5. It was demonstrated the possibility of using the proanthocyanidins extracted from grape seeds as agents inducing hair growth.

8. Roy, R.K., et al., 2006, found that the Petroleum ether extract of C. reflexa exhibited promising hair growth–promoting activity as reflected from follicular density, anagen/telogen ratio, and skin sections.

9. Ram Kumar Roy, et al., 2007, studied the Development and evaluation of polyherbal formulation for hair growth–promoting activity and revealed that hair growth initiation time was markedly reduced to one third on treatment with the prepared formulation compared with control animals.

10. Peter, E.M.J., et al., 2006, studied the stress-induced hair growth inhibition can serve as a highly instructive model for exploring the brain-skin connection and provides a unique experimental model for dissecting general principles of skin neuroendocrinology and neuroimmunology.

11. Inaoka et al., 1994, studied on active substances in herbs used for hair treatment. Effects of herb extracts on hair growth and isolation of an active substance from Polyporus umbellatus F. In the study it was shown to promote hair growth in mice, and 3,4-dihydroxybenzaldehyde was isolated as an active component.

12. The effect of hepatocyte growth factor/scatter factor (HGF/SF) on human hair follicle growth was examined using a serum-free organ culture system. The DNA synthesis in human hair follicles and elongation of the hair shaft were measured subsequent to the follicle isolation and culture at 31 °C in 95% O2-5% CO2 for 72 h. (Jindo, T., Tsuboi, R., Imai, R., 1994).

13. The isolation and viability in vitro of anagen secondary hair follicles of the Cashmere goat were studied. (Philpot, M.P., Green, M.R., Kealey, T., 1992.). The number of follicles
remaining viable during each 24 h measuring period was not affected by prolactin, but was significantly reduced by melatonin treatment after 96 h of maintenance.

14. **Ajay Kumar Meena *, Ajay Yadav, M M Rao., 2011.** Herbal medicines have been used from the earliest times to the present day. The ethnobotanical pharmacology is as old as man himself. Herbal medicines exhibit a remarkable therapeutic diversity. Calotropis procera Linn. is an Ayurvedic plant which is used in several traditional medicines to treat a variety of diseases.

15. **Eva Milena J. Peters,* Bori Handjisk.i.,(2004)** aimed at dissecting the role of NGF in stress-triggered hair growth termination in murine model. They suggested that NGF is a central element in the perifollicular neurogenic inflammation that develops during the murine skin response to stress and antagonizing NGF may be a promising therapeutic approach to counter the negative effect of stress on hair growth.

16. **Sharma M, Banerjee PS. 2009.** Prime object of present study is to develop and evaluate hair oil absolutely from herbal origin. The time required for complete hair growth was also considerably shortened. The result of treatment with formulated herbal hair oil was comparable with that of minoxidil, which was taken as a standard.

17. **Libecco JF, Bergfeld WF. Finasteride 2004.** The seeds of Tectona grandis Linn. are traditionally acclaimed as hair tonic in the Indian system of medicine. Hair growth initiation time was significantly reduced to half on treatment with the extracts compared to control animals. The treatment was successful in bringing a greater number of hair follicles (64% and 51%) in anagenic phase than standard minoxidil (49%). The results of treatment with 5% and 10% petroleum ether extracts were comparable to the positive control minoxidil.

18. **Adhirajan N, et al., 2003.** Concluded that the leaf extract, when compared to flower extract, exhibits more potency on hair growth. Petroleum ether extract of leaves and flowers of Hibiscus rosa-sinensis was evaluated for its potential on hair growth by in vivo and in vitro methods.

19. **Uno H, Kurata et al., 1993.** Analyzed the quantitative sequences of follicular size and cyclic phases, we speculate on the effect of agents on follicular growth. We also discuss the triggering mechanism of androgen in the follicular epithelial-mesenchymal (dermal papilla) interaction.
20. **Saraf S., 1991.** The present study is an effort to formulate and evaluate hair growth promoting activity of three polyherbal formulations. Polyherbal formulations were prepared using extract of *Cicer arietinum* Linn., *Ocimum sanctum* Linn. and *Cyperus rotundus* Linn. in various ratios to obtained the best formulation.

21. **Budd D, Himmelberger, 2000.** A questionnaire designed specifically to evaluate attitudes to hair loss. Men with greater hair loss were more bothered, more concerned about looking older due to their hair loss, and less satisfied with their hair appearance. Male pattern hair loss has significant negative effects on hair-loss specific measures in men 18 to 40 years of age in France, Italy, Germany and the UK. The degree that hair loss is perceived as noticeable to others appears to be a significant contributor to these negative effects.

22. **Roy RK, Thakur M, Dixit VK., 2006.** Studies were therefore undertaken to evaluate petroleum ether and ethanol extracts of *C. colocynthis* for their effect on hair growth in albino rats. The treatment was successful in bringing a greater number of hair follicles (>70%) to anagenic phase than standard minoxidil (67%). The result of treatment with 2 and 5% petroleum ether extracts were comparable with the standard minoxidil.

23. **Rushton, D. H., 2002.** The psychological impact of hair loss results in a measurably detrimental change in self-esteem and is associated with images of reduced worth. The main cause appears to be depleted iron stores, compromised by a suboptimal intake of the essential amino acid L-lysine. Correction of these imbalances stops the excessive hair loss and returns the hair back to its former glory. However, it can take many months to redress the situation.

24. **Ranganathan, S. and Shobana, S., 2008.** Three month evaluation of a herbal hair oil vs coconut oil was conducted on human volunteers with hair fall problem in a Y. M. T. Ayurvedic Medical College, Kharghar. Combing assay was performed to evaluate the efficacy of the herbal hair oil. The findings of the study show that the test oil was effective in reducing the hair fall.

25. **S. S. Roh et al., 2002.** Dried root of *Sophora flavescens* has outstanding hair growth promoting effect. After topical application of *Sophora flavescens* extract onto the back of C57BL/6 mice, the earlier conversion of telogen-to-anagen was induced.

26. **S. M. Upadhyay et al., 2011.** The study was aimed to investigate the efficacy of ethanolic extract of *H. rosa sinensis* flower as hair growth promoter. This study proved that ethanolic
extract of *H. rosa sinensis* flowesr may have potential as hair growth retarding agent so it may use in preparations for hair removing creams.

27. **Kabyashi, N., 1993.** Effects of 70% ethanolic extract from leaves of Ginkgo biloba (GBE) on the hair regrowth in normal and high butter diet-pretreated C3H strain mice which posterior hair we shaved were investigated. GBE showed a promoting effect on the hair regrowth.

28. **Mohan et al., 2011.** The present study was aimed to determine the effect of anthocyanidin fraction of Hibiscus rosasinensis (A-HRS: 100 and 300 mg/kg; p.o. or 4 weeks) on hypertension and oxidative stress induced by deoxycorticosterone acetate (DOCA)-salt in rats. A-HRS shows antihypertensive and antioxidant properties in DOCA model of hypertension.

29. **Waldon, D.J, 1993.**, attempts to solve the problem of follicle degeneration, we cultured follicles at the air-surface interface on a modified collagen matrix (Gelfoam). The results show that follicles cultured at the air-liquid interface maintain a better morphology and produced greater hair growth than follicles cultured on tissue culture plastic.

30. **Westgate, G.E., et al., 1993.** Reported the prolonged in vitro growth of isolated human hair follicles for at least 9 days. It is also shown that the patterns of keratin synthesis, as determined by [35S] methionine labelling, do not alter with maintenance.