standard deviation and % range of error for the proposed method is summarized in Table 1. Recovery experiments were performed by adding known amount of drug to previously analyzed pharmaceutical formulations. The results obtained by the proposed methods were in good agreement with the labeled amounts (Table 2).

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Development and Evaluation of Cosmeceutical Hair Styling Gels of Ketoconazole

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Cosmeceutical antidandruff hair styling gel formulations containing 0.5 to 1.5% of ketoconazole were developed using Carbopol 940, PEG-400, ethanol and water. All the formulations were characterized for viscosity, rheology, spreadability, pH, texture, drug content and antimicrobial activity against *Malassezia furfur*. Optimized gel formulation was tested for stability at varying temperature. Formulation containing 1% ketoconazole showed promising performance with respect to stability and antimicrobial activity. Thus, formulation containing 1% ketoconazole could be used as an effective antidandruff hair styling gel.

Ketoconazole[1,2] is an antifungal agent used in shampoos for the treatment of dandruff (*Pityriasis captitis*). The cause of dandruff[3] is still debatable but it is suspected that *Pityrosporon orbiculare* may be involved which assume pathogenic form under appropriate environmental condition and is called *Malassezia furfur*. Hair styling gel (HSG) are used to impart wet look, to hold ends of strands of long hair together, and to keep some loose strands of hair in place. Shampoos produce temporary antidandruff effect for short span of time. Hence, attempt has been made to develop ketoconazole HSG to provide antidandruff action for long duration with style to hair which may not be possible with shampoos.

HSG formulations containing 0.5% (F1), 1% (F2) and 1.5% (F3) of ketoconazole were developed using Carbopol 940 (0.40%), PEG 400 (30%), ethanol (30%) and water (40%). HSG were prepared by sprinkling Cabopol 940 slowly in water with stirring and kept overnight for hydration. Triethanolamine (0.5%) was added to induce gelation. Ethanolic solution of ketoconazole and PEG 400 were added with stirring to obtain desired formulations.

All the formulations were characterized for viscosity

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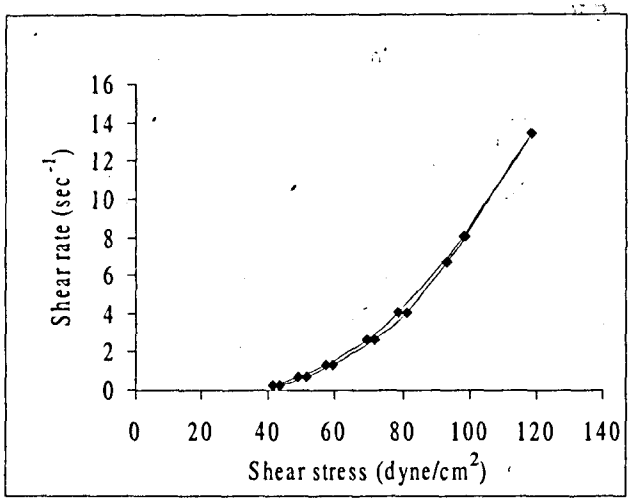

Fig. 1: Rheogram of F2 formulation

Rheogram showing thixotropic behavior of formulation containing 1% ketoconazole.

using Brookfield Viscometer (RV-DVE-230), rheology, spreadability[4], pH[5], drug content at 520 nm[6] and texture by psychorheologically using panel of volunteers and visual inspection. During the psychorheological evaluation, members of panel were asked to give their consent regarding the texture characteristics of HSG formulations. Microbiological studies were conducted in triplicate using control by Cup Plate method[7]. *Malassezia furfur* (MTCC 1374) pathogenic strain was used as biological indicator and Emmon's modification of Sabouraud's agar plus drop of sterile corn oil was used as growth medium. All the petriplates were maintained at 30° for seven days and at the end of study, zones of inhibition were measured using Hiantibiotic zone scale (Himedia, Mumbai).

All the formulations were smooth in feel without sign of clogging indicating good texture of formulations. Physical characterization indicated that all formulations had comparable and acceptable viscosity, spreadability, pH and drug content (Table 1). Rheologically all the formulations showed thixotropic behavior and rheogram of optimized formulation F2 is shown in fig. 1. The results of microbiological studies reflected that formulation F2 showed higher zone of inhibition (18.5±0.76 mm) as compared to F1 (15.3±0.12 mm) and F3 (16.8±0.72 mm). The reasons attributed to these findings might be effective release and diffusion of ketoconazole in the medium with subsequent attainment of its minimum

TABLE 1: CHARACTERISTICS OF HSG CONTAINING KETOCONAZOLE

Formulation	Viscosity(Cps)	Spreadability*(g.cm/s)	pH	Drug Content* (%)
F1	30290	15.93±1.76	5.98	99.1±0.14
F2	31130	14.18±0.98	6.13	98.8±0.66
F3	30800	15.41±1.24	6.10	100.5±1.18

*Each value represents mean±S.D (n=6). Cps stands for centipoise. Characteristics of formulations F1, F2 and F3 containing 0.5%, 1% and 1.5% ketoconazole, respectively.

TABLE 2: STABILITY STUDIES OF F2 FORMULATION AT 75±5 % R.H.

Temperature	0-8°			R.T.			45°±2°		
Months	1	2	3	1	2	3	1	2	3
Assay (%)	99.5	98.7	99.4	98.9	98.7	98.8	99.5	98.8	98.5
Viscosity (Cps)	31810	31854	32125	31300	31260	31100	31050	30750	30644
pH	6.12	6.27	6.15	6.17	6.28	6.10	6.15	6.25	6.18

R.T. and Cps stands for room temperature and centipoises, respectively. Stability studies of F2 formulation at varying temperature for three months.

inhibitory concentration.

Optimized formulation F2 was tested for stability at 0-8° (refrigerator), ambient temperature (R.T.) and 45±2° at 75%±5% R.H. for the span of three months. No significant changes were observed in the characteristics of F2 except slight changes in viscosity without sign of clogging (Table 2). Hence, it was concluded that HSG containing 1% of ketoconazole with Carbopol 940 base could be used as an effective cosmeceutical in the treatment of dandruff since it can prolong contact time and impart style to hair.

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Taste Masking of Quinine Sulphate

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Quinine sulphate, an antimalarial agent, is extremely bitter in taste. The present communication deals with development of taste-masked resinates of quinine sulphate using ion exchange resins. The drug resin complexation procedure was optimized with respect to parameters like drug to resin ratio, volume of medium and taste of the complex. The taste-masked complex was then formulated into a prototype suspension base. The suspension was evaluated for various quality control parameters. Taste evaluation of the suspension showed complete masking of the bitterness of the drug. *In vitro* release studies revealed complete drug elution from the complex after a period of 30 min in pH 1.2 buffer.

Ion exchange resins are water insoluble, cross-linked polymers containing salt forming groups in repeating positions on the polymer chains. They are used in many industries including pharmaceutical industry to stabilize sensitive compounds[1], as tablet disintegrants[2], for sustaining the release of the drug[3] and most importantly taste masking[4]. The ion exchange resin complexes with the drug through weak ionic bonding. Drug release from the resin depends on pH and electrolyte concentration within the gastrointestinal tract[5].

The present research work was focused on taste masking of quinine sulphate, having bitterness threshold of 0.0007% indicating its intense bitter taste. Chemically, quinine sulphate is (8R,9S)- 6-methoxyl cinchonan-9-ol sulphate dihydrate and it possesses antimalarial activity. The therapy of malaria lasts for 7 d. Formulation of palatable liquid dosage forms especially for pediatric and geriatric patients, who cannot swallow solid dosage forms, becomes a necessity.

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