Chemical analysis of hydroquinone and retinoic acid contents in facial whitening creams

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Hydroquinone is potentially carcinogenic and is known to be a skin and respiratory irritant. Hydroquinone is carcinogenic it has been banned in some countries because of fears of a cancer risk [1,2]. Animal studies have shown that topically applied retinoic acid can be photocarcinogenic [3].

The aim of this study was qualitative and quantitative determination of hydroquinone and retinoic acid contents in facial whitening creams by colour reaction tests, FT-IR after TLC separation and HPLC. The HPLC optimized chromatographic condition was methanol: water: acetic acid (95:5:0.15, v/v/v), pH 5.2, isocratic elution with flow rate of 0.5 mL min⁻¹, injection volume 10 μL and UV detection wavelength at 280 nm. The developed HPLC method gave a good sensitivity (LOD and LOQ were 0.03 μg mL⁻¹ and 0.09 μg mL⁻¹ for hydroquinone and 0.06 μg mL⁻¹ and 0.18 μg mL⁻¹ for retinoic acid). The calibration curves were linear (r² > 0.9995) over hydroquinone and retinoic acid concentration range of 1–9 μg mL⁻¹. The relative standard deviations of the method were 0.36% for injection precision of both analytes, less than 1.7% for intra-day precision and less than 1.9% for inter-day precision of hydroquinone and retinoic acid. Validated method was accurate with recoveries in the range of 95.46% to 103.11% for both analytes.

Two samples contained hydroquinone concentrations 2.71% and 8.93% which were higher than the recommended WHO limit of 2%. The detected retinoic acid concentrations in cosmetic samples were 0.0612% and 1.11%. Therefore, this study will be useful to ascertain the safety of cosmetic products for human health.

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Fig. 1 HPLC chromatogram of hydroquinone (HQ) and retinoic acid (RA).

REFERENCES

