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Design and development of polyherbal based cream formulation with anti-skin ageing benefits

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The objective of this study was to design and develop polyherbal cream-based formulation using combination of aqueous polyherbal extracts of *Rosa damascena* flowers (RDW), *Clerodendrum paniculatum* leaves (CPW), *Murraya koengii* leaves (MKW) and *Annona squamosa* leaves (ASW) which increased the collagen content in human dermal fibroblast thereby showing skin anti-ageing property. The presence of collagen-I content in human dermal fibroblast (HDF) cells was confirmed by ELISA. The three different ratios of plant extracts blends (CB 01, CB 02 and CB 03) were prepared. The extract blend (CB 03) in particular ratio (2:2:1:1) of the above individual plant extracts respectively showed 18.65 ± 0.061 ng/ml ($p < 0.05$) of collagen-I as compared to 16.53 ± 0.064 of standard ascorbic acid (ng/ml) at 100 µg/ml. Five different carrier cream base was developed (F-1, F-2, F-3, F-4 and F-5). F2(PHY/AAC/01) formulation was finalized with (CB 03) active blend (PHY/AAC/02) which showed 17.53 ± 0.011 ng/ml for collagen-I content in HDF cells. The *in vitro* safety of (CB 03) and (PHY/AAC/02) was measured by neutral red uptake assay using NIH3T3 cell lines, and the CTC50 value of (CB 03) and (PHY/AAC/02) was above 1000 µg/mL for 24-hour study period. The final formulations were studied for rheological studies and thermal stability was confirmed on basis of physicochemical properties like pH and viscosity. The study results for formulation (PHY/AAC/02) containing (CB 03) was found to upregulate Collagen-I gene expression compared to control and standard (market sample) which helps prevents skin ageing and promoted building of collagen matrix.

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