

# Role of cosmetic camouflage in improving quality of life in dermatological disorders: A narrative review

Astha Arora<sup>1</sup>, Mala Bhalla<sup>1</sup>

<sup>1</sup>Department of Dermatology, Government Medical College and Hospital, Chandigarh, India

## Abstract

Camouflage is a system of techniques using cosmetics to conceal, diminish and disguise visible disfigurements of pigment or texture of skin mainly over visible areas. A wide variety of options are available which can be used as camouflage cosmetics. Over the years many authors have published studies highlighting the importance of camouflage in different dermatological disorders like pigmentary, vascular, scars, acne vulgaris and many more. In this review we present 15 such studies assessing QOL in patients of dermatological diseases who were given camouflage therapy. The evidence presented here gives us an insight into the positive effects of camouflage/cover up make up when offered to patients with different dermatological conditions.

**Key words:** Cosmetic camouflage, quality of life, dermatological disorders.

## Introduction

Skin, hair and nails are crucial organs of cosmetic importance and they form the medium of expression of one's individuality. Flawless skin in today's social media-driven lifestyle has become a goal for one and all. Even slight imperfections seem unacceptable and are a cause of concern for patients suffering from pigmentary disorders, vascular lesions or in fact any blemish on the visible parts of the body. The pursuit of flawlessness has become of utmost importance. The treatments for such disorders usually take time to show results, therefore the use of corrective make up to cover the lesions till they show a clinical response has been shown to improve the patient's quality of life.

Camouflage, when simply described, is a system of techniques using cosmetics to conceal, diminish and disguise visible disfigurements of pigment or texture of skin mainly over visible areas. The main purpose is to help cope with the psychological effects by helping to normalise appearance and increase social acceptability. It was first introduced during World War II to help burn victims improve their appearance

and then further integrated with medical management by Joyce Allsworth, who formed the British Association of Skin Camouflage.<sup>1-4</sup>

A wide variety of options are available which can be used as camouflage cosmetics. The features common to all are that they should be opaque, waterproof, provide a good colour match, easy to apply and have good adherence to skin allowing long wear. The formulations of the camouflage cosmetics include creams, creamy and alcohol-based liquids, sticks and roll-ons. They usually have higher pigment content and fillers, thereby making them more opaque and more efficacious than commonly used make up. Various companies provide commercially available camouflage cosmetics in multiple colours, common ones being Dermacolor, Microskin and Dermablend Cover Creme Foundation. Theories of colour correction following the colour wheel and contouring to match skin's imperfections also need to be considered for providing a good camouflage of lesions.<sup>5,6</sup>

In order to help patients learn the subtleties of application of camouflage make up, the British Red Cross Society provides

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**Corresponding author:** Dr. Mala Bhalla, Department of Dermatology, Government Medical College and Hospital, Chandigarh, India. malabhalla@yahoo.co.in

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education services to patients in the United Kingdom free of cost in the Skin Camouflage clinic. These services are supplemented by Changing Faces which is a charity organisation providing trained practitioners of camouflage and teaching and providing patients with medical makeup free of charge. In the United States, state-licensed medically trained camouflage therapists are available, who not only have the knowledge to demonstrate but also educate patients on how to use make up correctly.<sup>1,7,8</sup>

Despite evidence of the ability of camouflage to improve the quality of life (QOL) in patients of facial disfigurement, dermatologists still do not practice it regularly for their patients. A cross-sectional study published by Sandhu *et al.* demonstrated that dermatology residents, although aware about camouflage, did not recommend it regularly and were not convinced of its role in clinical dermatology practice. The study highlighted the need to include camouflage awareness and training during residency to increase acceptability among dermatologists.<sup>9</sup>

In today's social media-driven world, the impact of various dermatological diseases on the QOL is being increasingly recognized and studied. To keep up with changing patient needs, a shift towards supportive care is the need of the hour whereby dermatologists institute camouflage or corrective make up to patients with dermatological disorders along with treatments to improve their QOL. To support this change, we present this review of studies assessing QOL in patients of dermatological diseases who were given camouflage therapy.

## Methods

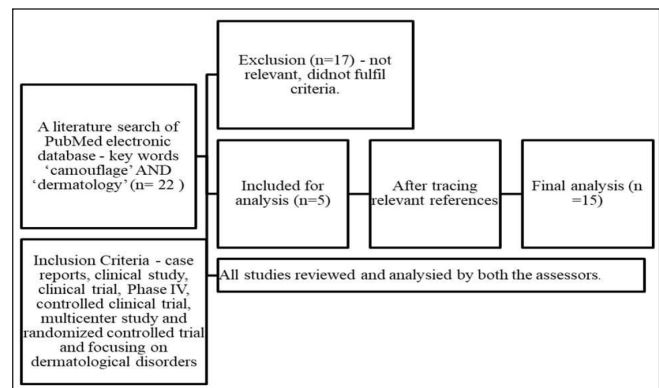
A literature search of PubMed electronic database was performed using key words 'camouflage' and 'dermatology'. A total of 22 search results appeared. Studies including case reports, clinical study, clinical trial, Phase IV, controlled clinical trial, multicentre study, and randomised controlled trial focusing on dermatological disorders have been included in this review. The studies that assessed QOL improvement by any of the multiple available tools were included. Only five relevant studies were found and abstracts of these were studied and reviewed by the two authors. The relevant references of the included articles were also traced and included, making a total of 15 case series and clinical trials. Studies focusing on QOL improvement in burn scars, post-radiation scarring, surgical scars, and head and neck cancers were not included in this review [Figure 1].

The objective of the review was to collate and analyse the evidence to suggest the impact of camouflage techniques on QOL improvement in various dermatological disorders using the available QOL indices.

## Results

### Study selection and overview

After literature research and cross-referencing, 15 studies<sup>10-24</sup> were included, of which 9 studies included multiple



**Figure 1:** Flow chart depicting the process of data collection and study analysis.

indications. Only four studies focused on vitiligo, one on acne vulgaris and one on lupus erythematosus.<sup>13,14,16,22-24</sup> Although all 15 were prospective studies, the control group was only present in 4 studies.<sup>14,16,22,23</sup> The age groups included were varied in most studies with four studies focusing on the paediatric age group<sup>15,19-21</sup> [Table 1].

### Patient demographics

A total of 893 patients were recruited and data have been analysed for 775 patients. The demographic details of the patients, different diagnostic categories studied, and number of patients in these individual classes has been described in Table 2. Mean duration of disease was provided only in eight studies with minimum duration being 1.625 years and maximum being 18.8 years with a mean of 10.6 years.

The details of the included studies have been included in Table 3.

### Quality of life measures analysed

Dermatology Life Quality Index (DLQI) was the most commonly used QOL index used in 10 of the 15 studies individually or in combination with other scoring systems. Similarly, Children DLQI (cDLQI) was a standard QOL used in studies on the paediatric population.<sup>25,26</sup> The mean pre-treatment DLQI was 8.68 which reduced to 4.37 after camouflage therapy with maximum pre-treatment value being as high as 13.4 and minimum post-treatment value falling to 3.0. Similarly, a reduction in cDLQI was also observed with mean pre-treatment value of 7.5 and post-treatment value of 3.16.

### DLQI comparison between diagnostic categories

Four studies discussed the QOL improvement in different diagnostic categories, mainly pigmentary, acne, vascular and scarring. Holme *et al.* observed maximum improvement in DLQI in scarring category (10.2–5.6) followed by vascular (8–3.3) and pigmentary (8.6–6.3) with p values <0.0001, <0.01 and <0.05, respectively.<sup>11</sup> Seite *et al.* also reported a similar result with larger improvement of DLQI among

**Table 1: Descriptive analysis of the studies which have been reviewed**

		No. of studies
Total		15
Indications studied	Vitiligo	4 <sup>13,16,23,24</sup>
	Acne	1 <sup>14</sup>
	Systemic lupus erythematosus	1 <sup>22</sup>
	Multiple	9
Type of study	Prospective studies	15
	Control group present	4 <sup>14,16,22,23</sup>
Duration of studies	Minimum	2 weeks
	Maximum	24 weeks
	Mean	7.6 weeks
Age group studied	Adults	9
	Paediatrics	4 <sup>15,19,20,21</sup>
	Both	2
QOL questionnaire used	DLQI	10
	cDLQI	4 <sup>15,19,20,21</sup>
	Other QOL questionnaires	Skindex 16 <sup>12</sup> QOL perception without skin blemish <sup>12</sup> WHOQOL 26 <sup>14</sup> fDLQI <sup>21</sup> EuroQOL5D <sup>24</sup> SF36 <sup>24</sup>
	Disease specific	SLE QOL <sup>22</sup> VitiQOL <sup>24</sup>
	Psychological effect	FNE <sup>12</sup> Worry over skin disease <sup>12</sup> Rosenberg self-esteem questionnaire <sup>22</sup> Hospital Anxiety and Depression Scale <sup>22</sup>

DLQI: Dermatology life quality index, FNE: Fear of negative evaluation, QOL: Quality of life, cDLQI: Children’s dermatology life quality index, fDLQI: Family dermatology life quality index, SLEQoL: Systemic lupus erythematosus – specific quality of life, HADS: Hospital anxiety and depression scale: EQ5D: EuroQol-5 dimension questionnaire, SF36: Short form health survey, VitiQol: Vitiligo quality-of-life index.

patients with vascular disorders (5.35–3.26, P, 0.0001) but contrastingly smaller improvement among individuals with scars (5.52–4.39, P, 0.0001).<sup>17</sup> Peuvrel *et al.* stated significant change in DLQI in two of the three disorder sub-groups, i.e., acne (p = 0.006) and rosacea (p = 0.036), and scar group also showed a decreasing trend (p = 0.057).<sup>18</sup> Ramien *et al.* showed improvement in cDLQI in both main categories, namely, vascular and pigimentary. In vascular category, cDLQI reduced from 4.1 to 1.0 (p 0.003) and pigimentary anomalies from 6.2 to 3.2 (p – 0.020). Patients with vascular malformations showed maximum reduction from 5.5 to 1.5 (p - 0.002) under the vascular category.<sup>20</sup>

**Individual parameter changes in DLQI**

DLQI is a 10-item questionnaire analysing QOL under different spheres like symptoms and feelings, daily activities, leisure, work and school, personal relationship, and discomfort of treatment. Seven studies discussed the most affected items and further the items that showed most improvement and

**Table 2: Patient demographic data and dermatological indications**

Total patients recruited		893
Patients analysed		775
Age (in years)	Mean (mean of mean)	33.4
	Range	4–79
Male : Female ratio		1:5.63
<b>Dermatological indications</b>	<b>No. of patients</b>	
Pigmentary	Vitiligo	266 (34.3%)
	Melasma	22 (2.8%)
	Lentigo, café au lait macules, post-inflammatory hyperpigmentation	9 (1.1%)
	Not defined	71 (9.1%)
Acne and scars		127 (16.3%)
Vascular		67 (8.6%)
Rosacea		30 (3.8%)
Connective tissue disease	Lupus erythematosus	46 (5.9%)
	Morphea	4 (0.5%)
	Not defined	4 (0.5%)
Scarring		47 (6%)
Naevus		12 (1.5%)
Others/undefined		70 (9%)

these have been described in Table 4. The most affected area was symptoms and feelings followed by daily activities and these parameters showed significant improvement in addition to leisure. But in the study by Holme *et al.* which was one of the earliest studies, the highest score was in the area of symptoms and feelings and daily activities and leisure. A reduction was observed in all scores post-camouflage use but interestingly personal relationship showed the most improvement with approximately 80% reduction in scores as compared to other parameters.<sup>11</sup>

**Other scores**

Balkrishnan *et al.* discussed QOL improvement in various disorders using Skindex 16 which reduced from 59.8 to 40.2, fear of negative evaluation which reduced from 37.6 to 33.6, worry about skin discoloration which reduced from 8.8 to 1.4, and QOL perception with and without skin blemish which reduced from 4.2 to 1.4.<sup>12</sup>

Ongena *et al.* in addition to DLQI used a stigmatisation questionnaire in which anticipation of rejection (56%, SD 21%) and guilt and shame (58%, SD 20%) are the most affected ones.<sup>13</sup>

Matsouka *et al.* used World Health Organization (WHO) QOL26 (WHOQOL 26) and DLQI in a comparative study on female acne patients. WHOQOL 26 was affected in all domains, and in the intervention group, maximum improvement was observed in the psychological domain.<sup>14</sup>

Olivieria *et al.* performed a comparative analysis in patients of systemic lupus erythematosus and used a disease-specific score Systemic Lupus Erythematosus – Specific Quality Of

Table 3: Detailed descriptions of the studies reviewed

S No.	Study, Year	Type	No of patients (analysed)	Age	Sex	Indication	Duration	Outcome measure	Result
1	Boehncke <i>et al.</i> , 2002 <sup>10</sup>	Prospective study	20	16-69	M-0 F-20	Acne, Rosacea, CLE, Vitiligo	2 weeks	DLQI	Improved from 9.2 at baseline to 5.5. More improvement in less severe scores.
2	SA Holme <i>et al.</i> , 2002 <sup>11</sup>	Prospective study	82	16-78	M-6 F-76	Pigmentary Scar Vascular Rosacea Others	1 month	DLQI	Improved from 9.1 to 5.8.
3	Bal Krishnan <i>et al.</i> , 2005 <sup>12</sup>	Prospective study	63	19-46	M-0 F-63	Acne Pigmentary Vascular Rosacea naevi	3 months	Skindex-16 scores, FNE scores, QOL perception with and without facial blemish and worry about skin discoloration	Skindex-16 – 59.8 to 40.2 FNE – 37.6 to 33.6 QOL perception with and without facial blemish – 4.2 to 1.4 Worry about skin discoloration – 8.8 to 4.7
4	Ongenaes, 2005 <sup>13</sup>	Open label study	62	16-68	M-6 F-56	Vitiligo	1 month	DLQI, Adapted stigmatisation questionnaire	Significant improvement in DLQI – 7.3 to 5.9 Adapted stigmatisation questionnaire – 38.4% reduction
5	Matsuoka <i>et al.</i> , 2006 <sup>14</sup>	Randomised control	50 A (25) – demonstration of use of cosmetics with treatment B(25) – only treatment	A - 24±3 B - 25 ±5	M-0 F-50	Acne	4 weeks	WHO QOL26 DLQI	WHO QOL26 A – 3.27 to 3.39 B – 3.36 to 3.44 DLQI A – 8.24 to 3.88 B – 6.24 to 3.24
6	Tedeschi <i>et al.</i> , 2007 <sup>15</sup>	Prospective study	15	7-16	M-3 F-12	Acne Vitiligo Becker's Naevus Striae distensae Allergic contact dermatitis Post-surgery scarring	2 weeks	Satisfaction of parents in providing cover	
7	Tanioka <i>et al.</i> , 2010 <sup>16</sup>	Prospective control study	32 A – (21) – given camouflage lessons B – (11) – no lessons given	A – 48.1 B – 40.8	M- A – 11 B – 6 F A – 10 B – 5	Vitiligo	4 weeks	DLQI	DLQI improvement in both groups A – 5.9 to 4.48 B – 3.18 to 4.36 Maximum improvement in item 2
8	Seite <i>et al.</i> , 2012 <sup>17</sup>	Prospective study	129	42±1.4	M-7 F-122	Acne Vascular Pigmentary Others	4 weeks	DLQI	Improved from 9.9 to 3.49 More improvement in item 9 with improvement in all other items.

(Contd)

Contd

S No.	Study, Year	Type	No of patients (analysed)	Age	Sex	Indication	Duration	Outcome measure	Result
9	Peuvrel <i>et al.</i> , 2012 <sup>18</sup>	Open prospective study	63	4-79	M-7 F-79 (of the 86 recruited)	Acne Rosacea Scars Vascular Pigmentary Connective tissue diseases	1 month	DLQI	Significant improvement in DLQI - 7.3 to 4.6 More improvement in acne, rosacea and scar Items 1 and 2 showed maximum improvement.
10	Padilla-España <i>et al.</i> , 2013 <sup>19</sup>	Case Report	6	10-15	M-1 F-5	Acne Naevus Vitiligo	2 weeks	cDLQI	Improvement in cDLQI - 10.6 to 4.33
11	Ramien, 2014 <sup>20</sup>	Open label prospective study	38	5-18	M-4 F-37 (41 initially recruited)	Vascular Naevus Vitiligo Post-inflammatory hyperpigmentation	6 months	cDLQI	Improved from 5.1 to 2.1 More improvement in pigmentary and vascular abnormalities.
12	Salsberg <i>et al.</i> , 2015 <sup>21</sup>	Open label prospective study	22	5-17	M-3 F-19	Vascular Naevus Vitiligo Morphea Café au lait macules	1 month	cDLQI fDLQI	Significant improvement cDLQI - 6.82 to 3.05 fDLQI - 7.68 to 4.68
13	Oliveira <i>et al.</i> , 2020 <sup>22</sup>	Randomised controlled intervention study	43 A (28)- Intervention - use camouflage B (15)- control	38-55	M-0 F-43	Systemic lupus erythematosus (Discoid, subacute cutaneous and acute lesions)	24 weeks	SLEQoL DLQI Rosenberg self-esteem scale HADS	SLEQoL - A - 118 to 96.5 B - 89 to 153 DLQI A - 8.5 to 3.5 B - 8.0 to 7.0 Rosenberg self-esteem scale A - 27 to 29.5 B - 27 to 29.0 Hospital Depression Scale A - 8.0 to 7.0 B - 5.0 to 5.0 Hospital Anxiety Scale A - 9.0 - 8.0 B - 6.0 - 9.0
14	Bassiomy <i>et al.</i> , 2020 <sup>23</sup>	Prospective randomised study	100 A (40) - camouflage group B (60) - control group	4-70	M-56 F-44	Vitiligo	4 weeks	DLQI	Improved A - 13.4 to 7.5 B - 11.9 to 10.6
15	Morales <i>et al.</i> , 2022 <sup>24</sup>	Uncontrolled quasi experimental study	45	42.4 ± 13.7	M-10 F-35	Vitiligo	16 weeks	VitiQoL DLQI EQ5D SF36	VitiQoL - 46.2 to 31.9 DLQI - 8.0 to 3.0 EQ5D - 82 to 90 SF36 - Emotional limitations 100 to 100 Emotional well-being 68 to 76 Social functioning 75 to 100

DLQI: Dermatology life quality index, FNE: Fear of negative evaluation, QoL: Indicates quality of life, WHOQOL26: World health organization (WHO)QOL26, cDLQI: Children's dermatology life quality index, fDLQI: Family dermatology life quality index, SLEQoL: Systemic lupus erythematosus - specific quality of life scale, HADS: Hospital Anxiety and Depression Scale, EQ5D: EuroQoL-5 Dimension questionnaire, SF36: Short form health survey, VitiQoL: Vitiligo quality-of-life index.



**Table 4: Individual DLQI item analysis**

Study	Indication	Item affected	Item most improved
Holme <i>et al.</i> <sup>11</sup>	Multiple	Symptoms and feelings, daily activities and leisure (2,4,5)	Personal relationships (8,9)
Ongena <i>et al.</i> <sup>13</sup>	Vitiligo	Symptoms and feelings and daily activities (2,4)	Symptoms and feelings, daily activities and leisure (1,2,4,6)
Matsouka <i>et al.</i> <sup>14</sup>	Acne	Symptoms and feelings and daily activities (1,2,3,4)	Symptoms and feelings, daily activities, leisure and personal relationships (1,2,5,6,8,9)
Tanioka <i>et al.</i> <sup>16</sup>	Vitiligo	All	Symptoms and feelings (1,2)
Seite <i>et al.</i> <sup>17</sup>	Multiple	Symptoms and feelings (2)	Symptoms and feelings, daily activities and leisure (2,3,5)
Peuvrel <i>et al.</i> <sup>18</sup>	Multiple	Data not available	Symptoms and feelings, daily activities (1,2,3,4)
Ramien <i>et al.</i> <sup>20</sup>	Multiple	Data not available	Symptoms and feelings, daily activities and leisure (1,2,3,4,5)

Life Scale (SLEQoL) which showed a significant reduction in the camouflage group (Friedman's test  $p = 1/4$  0.005) with improvement in areas of mood and self-image and physical functioning. Psychological and self-esteem impact was assessed using the Rosenberg self-esteem scale score and anxiety and depression using the Hospital Anxiety and Depression Scale. Although there were no statistically significant changes in the scores at follow-up, improvement in self-esteem ( $p = 0.041$ ), anxiety ( $p = 0.045$ ), and depression ( $p = 0.033$ ) was still observed as an independent observation.<sup>22</sup> Morales *et al.* studied 45 patients of vitiligo and used vitiligo-specific Vitiligo Quality-Of-Life Index which showed significant reduction from  $46.2 \pm 22.7$  to  $31.9 \pm 20.4$  and  $p < 0.001$ . Another scoring system used was EuroQol-5 Dimension questionnaire, a visual analogue scale-based system and it showed improvement from 82 to 90 ( $p = 0.007$ ). Short Form Health Survey analysed emotional limitations, emotional well-being, and social functioning which all showed improvement.<sup>24</sup>

## Discussion

QOL of an individual is a major determinant of mental and social health, with ill health usually resulting in its deterioration. Dermatological disorders, especially chronic disfiguring dermatoses, are major contributors resulting in a decline of QOL and this has been well substantiated in literature. Over the years, physicians have tried to devise various techniques to help improve the QOL of their patients over and above therapeutic treatment. Camouflage forms an important subset of these techniques which, when used appropriately under the right guidance, proves to be an important tool in patients suffering from visible deformities of skin and associated structures.<sup>27-29</sup>

This review included studies focused on quantifying improvement in QOL of various dermatological disorders after camouflage therapy using various parameters of assessment [Table 1]. It was observed that camouflage can be used for multiple indications which can broadly be classified as pigmentary disorders, acne, vascular abnormalities, and scarring.

Pigmentary diseases including vitiligo, melasma, lentigo, café au lait macules, and post-inflammatory hyperpigmentation were the most commonly evaluated indications, of which vitiligo was the most common. It was observed that DLQI assessment in these patients showed significant improvement

in scores after camouflage use. Vitiligo was the most commonly studied pigmentary disorder, likely because it causes significant deformity in skin of colour as the colour discrepancy is more evident. These disorders prove to be an ideal dermatosis for camouflage therapy as the skin texture is maintained and only the skin colour needs to be corrected by a carefully matched skin shade. The improvement in QOL in these individuals was lesser when compared to other indications but this may be because of the stigma associated with it. This issue should be explored in larger studies.<sup>30-32</sup> Some authors believe that camouflage therapy may hamper the treatment of vitiligo but Li *et al.* in 2020 found that there was no difference in repigmentation and transepidermal water loss in patients using dihydroxyacetone containing camouflage as compared to controls.<sup>33</sup>

Acne was another indication evaluated in the paediatric and the young adult population. Severe acne, mainly affecting the young adults, is an important cause of psychological stress leading to depression, anxiety and suicidal tendencies. Improvement in QOL with reduction in DLQI scores was observed in patients advised camouflage therapy in addition to medical treatment of acne.<sup>34,35</sup> Cosmetics usually are considered to exacerbate acne and rarely advised by dermatologists. But Hayashi *et al.* in 18 female patients observed that make up designed for acne-prone skin did not worsen the severity of acne; rather, it significantly improved the QOL.<sup>36</sup>

Vascular lesions include a large variety like spider angiomas, port wine stain, haemangiomas, telangiectasia, etc., and the treatment options are often limited and have questionable efficacy. As observed, vascular lesions showed maximum improvement in QOL when compared to other indications. This may be due to the fact that these lesions especially on visible areas cause significant cosmetic disfigurement due to colour contrast. Camouflage using colour correction and correct skin matching may give an apparently normal appearance to the patients thereby improving QOL in lesions that may otherwise have minimal curative options.<sup>37-40</sup>

Camouflage by using colour correction and concealing may give an apparently normal appearance to the patients and thereby improve QOL in lesions that may otherwise have minimal curative options. Scarring due to acne, post-surgery, post-trauma or radiation causes change in both colour and texture of skin causing a visible deformity with scarce

options of correction. Scars, although symbolising survival and being inevitable, may be a source of anxiety and stress to patients. Thus, scars when corrected with camouflage using contour correction help improve QOL. Camouflage used in patients immediately post-surgery to cover scars has been shown to improve QOL and provide better recovery psychologically.<sup>41-44</sup>

In the studies in this review, a vast array of scoring systems were utilised, the most common being DLQI which is a widely used and validated QOL measure designed for dermatology patients. As reviewed, camouflage therapy showed improvement in symptoms and feelings questions of the questionnaire signifying that it decreases the feelings of embarrassment and self-consciousness in the patients about their appearance due to the skin disease.<sup>25,26</sup> Other scoring systems also showed similar patterns of improvement in areas of appearance, self-esteem and psychological well-being. These scores helped to objectively evaluate the efficacy of camouflage in improving QOL and validate its utility in regular clinical dermatological practice.

## Conclusion

The evidence presented here gives us an insight into the positive effects of camouflage/cover up make up when offered to patients with different dermatological conditions. It leads us to reflect and re-analyse the supportive clinical care of patients with visible disfigurements beyond standard treatment protocols and encourages us to explore the field of camouflage therapy to provide better QOL to our patients.

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