Dermatology Practical & Conceptual

Impact of Vitiligo on Quality of Life in Patients of Skin of Color and Its Correlation With Clinical Severity Assessment Scores Utilizing Disease Specific Scores: A Cross-Sectional Study

Guneet Awal[1], Navleen Kaur[1], Guramrit Singh[1], Nishant Sharma[2]

1 Department of Dermatology,Venereology and Leprosy, Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar, India
2 Department of Community Medicine, Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar, India

Key words: vitiligo, quality of life, skin of color, VIS-22, VitiQoL

Citation: Awal G, Kaur N, Singh G, Sharma N. Impact of Vitiligo on Quality of Life in Patients of Skin of Color and Its Correlation With Clinical Severity Assessment Scores Utilizing Disease Specific Scores: A Cross-Sectional Study. *Dermatol Pract Concept.* 2024;14(2):e2024075. DOI: https://doi.org/10.5826/dpc.1402a75

Accepted: October 18, 2023; **Published:** April 2024

Funding: None.

Competing Interests: None.

Authorship: All authors have contributed significantly to this publication.

Corresponding Author: Dr. Guneet Awal, 469,East Mohan Nagar, Opp. DSP Park,Amritsar, Punjab 143001.
Phone numbers- 9988834379,9115703086 E-mail: guneetawal@gmail.com

ABSTRACT

Introduction: Assessment of disease severity of vitiligo is exigent as it is a psychosomatic ailment. VIDA (vitiligo disease activity score) and VASI (vitiligo area severity index) were previously used for this evaluation. Recently, the introduction of two vitiligo specific tools, vitiligo impact scale (VIS)-22 and Vitiligo Quality of Life Index (VitiQoL) has aided in assessing the quality of life (QOL) in a pertinent manner.

Objectives: To measure the QOL in vitiligo using disease specific indices (VitiQoL and VIS-22), to assess their relationship with disease severity (VASI and VIDA) and to determine the correlation between QOL scores (VIS-22 and VitiQoL).

Methods: This observational cross-sectional study included 195 patients with vitiligo, and their disease severity was calculated using VASI and VIDA scoring. Patients were asked to fill questionnaires for assessing the QOL using validated tools i.e. VIS-22 and VitiQoL.

Results: Significant correlation was demonstrated between both QOL scores and VASI score (P value 0.001) with slightly higher values for VitiQoL (r = 0.824) than with VIS 22 (r = 0.693). Both scores exhibited a significant association with VIDA score (P value < 0.001). Moreover, statistically significant correlation was found between VIS-22 and VitiQoL, thereby proving the concordance between these scores.

Conclusions: The study infers that QOL seemed to be remarkably dependent on the clinical severity scores and that higher disease activity corresponds to poorer QOL. It is imperative to precisely assess burden of vitiligo and the impairments caused by it in order to aid multi-modality management and allow more standardized research.

Introduction

Vitiligo, a pigmentary disorder with loss of melanocytes, although predominantly asymptomatic, is a cause of great cosmetic and psychological concern [1]. There is an increasing prevalence of vitiligo affecting up to 1%-4% of the world population. In India, vitiligo has been known as "sweta kustha," which translates as "white leprosy"[2]. Individuals with vitiligo may be treated with stigma due to false belief of having Hansen disease, which can be acquired by contact, thereby causing low self-esteem, poor body image and depression [3]. They face difficulty in finding jobs and getting married as a result of social discrimination and cultural beliefs, leading to anxiety and distress.

Vitiligo can be classified as a psychosomatic ailment, with both psychological and physical elements contributing to disease development, relapses and remissions [4]. Assessment of disease severity is imperative since it affects patients psychological well-being. Vitiligo Area Scoring Index (VASI) is a quantitative score given by Hamzavi et al in which hand units are used to calculate percentage of vitiligo involvement [5]. Vitiligo disease activity score (VIDA) is another assessment tool which is based on subjective assessment of disease activity [6].

Earlier there was no specific quality of life (QOL) assessment tool for vitiligo and it was measured by using nonspecific tools such as Dermatology Life Quality Index (DLQI), Skindex-26 and SF-36 [2,7-9]. However, it is increasingly recognized that vitiligo has a greater impact on QOL owing to psychological concerns such as lack of self-confidence, unfavorable body views, and failed social interactions, rather than physical problems [7,8,10,11]. Hence, two vitiligo specific tools have been developed, which are Vitiligo impact scale (VIS)-22 and Vitiligo Quality Of Life index (VitiQoL) [12,13]. VitiQoL is an objective, vitiligo specific measure of disease status, burden and treatment outcome for patients. It is substantiated using disease-specific items from in-depth open-ended patient interviews, clinical input and literature review [14]. Similarly, VIS-22, another disease-specific questionnaire, consists of 22 easily understandable questions: 19, common to all patients and one each for patients who are married, unmarried, working, or studying.

Objectives

In this article we have assessed and analyzed the QOL of vitiligo patients using disease specific indices, and its relationship with clinico-demographic patterns and severity of vitiligo as there is paucity of data on their correlation in Indian patients.

Methods

Study Site and Population

A total of 195 clinically diagnosed patients of vitiligo attending the dermatology department of a tertiary care hospital were included in this cross-sectional, questionnaire-based study after obtaining informed consent.

Study Period

It was conducted over a period of 2 years from August 2019 to July 2021.

Inclusion Criteria

All consenting patients aged ≥18 years with clinical diagnosis of vitiligo were included.

Exclusion Criteria

Patients less than 18 years of age or with other disorders and disabilities associated with social stigma.

Study Procedure

Demographic details including the patients name, age, sex, occupation, marital status, duration, onset and progression of the disease were recorded. Patients were diagnosed clinically and the findings were corroborated with dermoscopy. The severity of disease was calculated by using VASI and VIDA scoring and their correlation with VIS-22 and VITIQoL scores was evaluated.

Study Measurement Tools

VASI score is a quantitative severity evaluation score that is evaluated in the same way as the Psoriasis Area and Severity Index (PASI) score. The magnitude of residual depigmentation is indicated as: 100%-depigmented area exceeds the pigmented area; 50%-depigmented and pigmented areas are equal; 25%-pigmented area exceeds the depigmented area; and 10%-specks of depigmentation are present [5]. Each body site (Hands, upper extremities, trunk, lower extremities and feet) VASI is calculated. The cumulative body VASI is determined as (range of 0-100):

$$\text{VASI} = \Sigma(\text{all body sites})\ (\text{hand units}) \times (\text{residual depigmentation})$$

Njoo et al utilized the VIDA score for the first time in 1999[6]. It is a six-point scale based on patient perception of disease activity over time and is graded as follows-VIDA score + 4: activity lasting 6 weeks or less; score +3: activity lasting 6 weeks to 3 months; score 2: activity lasting 3-6 months; score1: activity lasting 6-12 months; score 0: stable for 1 year or more; score -1: stable with spontaneous

re-pigmentation for 1 year or more. A low Vitiligo disease activity score indicates less vitiligo activity.

Lilly et al in 2013 proposed VitiQoL, which is a disease specific instrument based on three factors: stigma, participation limitation and behavior [14]. It comprises of 15 questions with a seven-point Likert scale (0-6) and the total scores ranging from 0 to 90.Individuals with higher scores indicate a poorer QOL.

VIS-22, the modified version of VIS, comprises of 22 items encompassing areas of self-confidence, anxiety, depression, marriage, family worries, social interactions, school/college related, occupation related, treatment related and attitude. Individual responses were scored from 0 to 3; a higher score denoting worse QOL [12,15]. Gupta et al graded the VIS-22 scores as: 0-5: no impact; 6-15: mild impact; 16-25: moderate impact; 26-40: large impact and 41-66: very large impact [16].

Ethical clearance for the study was obtained from the Institutional Ethics committee. Required permissions were obtained before the use of these assessment scores for the present study. The patients were asked to fill the questionnaires to assess the QOL using validated tools ie VIS-22 and VitiQoL. A bilingual dermatologist translated the English versions of both the questionnaires into Punjabi language. Backward translations were done by a different bilingual dermatologist. The validity of translations was cross-checked by the evaluators.

Statistical Analysis

Data was analyzed using Statistical Package for the Social Sciences version 26 software (SPSS Inc.). Qualitative data were described using number and percentages. Descriptive statistics, mean and SD were calculated for quantitative variables. For assessment of correlation between QOL and vitiligo severity scores, Pearson correlation coefficient was used. For comparison of demographic profile, independent t test and analysis of variance (ANOVA) test was used. Probability value (P value) of less than 0.05 was considered significant. Intra class correlation coefficient was used to find agreement between the two quality of life scores.

Results

A total of 195 patients were recruited in the study. The mean age was 35.64 ± 14.76 years. Vitiligo was most commonly seen in patients aged 30 to 39 years (34.35%) with mean duration of 6.7 years and maximum (39.49%) patients presenting within 3 years of onset. Family history of a first-degree relative with vitiligo was positive in 34 patients (17.43%). Mostly, patients belonged to Fitzpatrick skin type 3(39.48%) and 4(51.28%). 115 patients were married whereas 72 were single and 8 divorced. The most common occupational group was laborer (40%) followed by student (18.5%), household worker (17.95%), semiskilled worker (13.84%), skilled worker (6.67%), and unemployed (3.04%). Both exposed and nonexposed sites were involved in 42.56%, only non-exposed sites in 36.4% and exposed sites in 21.02% patients. Of these, upper limbs constituted 24.1% followed by lower limbs (15.89%).

A maximum number of patients (27.17%) had VIDA score of +2, 24.61% of +3 whereas 15.38% had VIDA score of 0. The mean VASI score in this study was 12.63±8.06 and it was significantly associated with duration of disease ($P < 0.05$). There was significant association between VASI score and VIDA score, with highest VASI score in patients with a VIDA score of +4.

Overall, the mean VIS-22 score of our study population was 27.25±11.19, reflecting altogether a large impact on QOL with the mean score in females (27.76±11.86) being higher than males (26.91±10.82), though not statistically significant. Patients within age group 18-29 years and disease duration of 7-12 years had the highest VIS-22 score of 29.65±14.07 and 28.32±11.96 respectively. Skilled patients had the lowest VIS-22 score (23.15±9.51) while the household workers and laborers had higher VIS-22 scores (29.52±12.57 and 28.02±11.39 respectively). VIS-22 scores were higher among divorced patients (33.25±13.71), individuals with skin type V (29.11±12.7) and who had lesions on exposed parts of the body (27.92±11.31). The score was highest in patients with lesions on face (33.64±14.82) followed by chest (31.24±12.43) (Table 1).

Out of 195 patients, most patients had moderate impact (45.4 %) and large impact (33.7 %) with fewer having mild impact (8.6%) and very large impact (12.2%) in their QOL (Figure 1A). Maximum number (47%) of males had moderate impact on QOL with respect to VIS-22 scores whereas maximum number of females (49%) had large impact (Figure 1B).

Statistically significant strong correlation was observed between VIS-22 and VASI scores (r 0.693, P value < 0.001) as shown in Figure 2A. Overall, mean VASI scores were highest (25.91±11.84) in patients who had large impact followed by those who had moderate impact on their QOL (13.18±4.77) (Table 2). While ascertaining the strength of relationship between VIS-22 and VIDA score using Pearson correlation coefficient, a weak positive correlation was determined between these scores (P value<0.001) (Figure 2B).

The questions related to social interactions (3, 12 and 13) and anxiety (2,11) domains were the major contributors to VIS-22 scores in our study.

A higher VitiQoL score was seen in females (25.75±14.15) as compared to males (24.34±12.98) ($P > 0.05$). A significant association (P value< 0.05) was seen between VitiQoL scores and age of patient (18-29 years; 29.77±17.97) as well as

Table 1. Correlation of VIS-22 Score With Demographic Variables in patients of vitiligo

VIS22		N	VIS22 mean	Standard deviation of VIS22	P value
Gender	F	118	26.9153	10.82145	0.606
	M	77	27.7662	11.86647	
Age	18-29	48	26.3958	11.58271	0.567
	30-39	66	27.0000	9.78067	
	40-49	46	26.6739	10.46062	
	>50	35	29.6571	14.07113	
Duration of disease	<3	78	28.3205	11.96802	0.757
	3-6	56	26.8214	11.13080	
	7-12	31	25.2581	9.67460	
	13-15	18	27.9444	12.52044	
	>15	12	26.4167	8.94893	
Family history	Positive	57	27.1930	10.22329	0.963
	Negative	138	27.2754	11.64673	
Marital status	Divorce	8	33.2500	13.70870	0.304
	Single	70	27.1000	11.60104	
	Married	117	26.9316	10.80128	
Occupation	Student	35	27.0857	11.89259	0.388
	Labour	78	28.0256	11.39603	
	Household worker	36	29.5278	12.75816	
	Semiskilled	27	24.7407	7.96914	
	Skilled	13	23.1538	9.51180	
	Unemployed	6	24.6667	10.30857	
Skin type	Type III	75	28.1333	11.71201	0.436
	Type IV	103	26.3010	10.56338	
	Type V	17	29.1176	12.97537	
Sites	Exposed	41	27.9268	11.31457	0.977
	Covered	70	26.2714	11.54440	
	Exposed+covered	84	27.3929	11.03883	
Individual sites	Scalp	7	22.8571	9.90671	0.065
	Face	17	33.6471	14.82793	
	Chest	25	31.2400	12.43074	
	Abdomen	28	24.1429	7.88207	
	Back	26	29.1154	11.76206	
	UL	47	25.7872	10.75808	
	LL	31	26.0645	9.81813	
	Genital	6	23.6667	7.22957	
	Mucosal	8	25.7500	12.98075	

VIS = vitiligo impact scale.

longer duration of disease (>15 years; 29.91±15.03). Higher scores were observed in divorced patients (29.00±10.81), those with skin type V (28.64+-15.61) and who had lesions on exposed parts (25.68+-14.66) especially facial (29.52±20.11) and mucosal lesions (28.25±15.53). Scores were lowest in skilled workers (19.07±5.34) as compared to other occupational groups (Table 3).

Figure 3A represents scatter plot depicting correlation of VASI score (12.63±8.06) with VitiQoL score (24.89±13.40) in which both the scores were found to have very strong correlation(r value 0.824 and P value < 0.001).On further analysis of the VitiQoL questionnaire, it was observed that female patients had statistically more significant limited social participation(4.21±1.34) and changes in behavioral

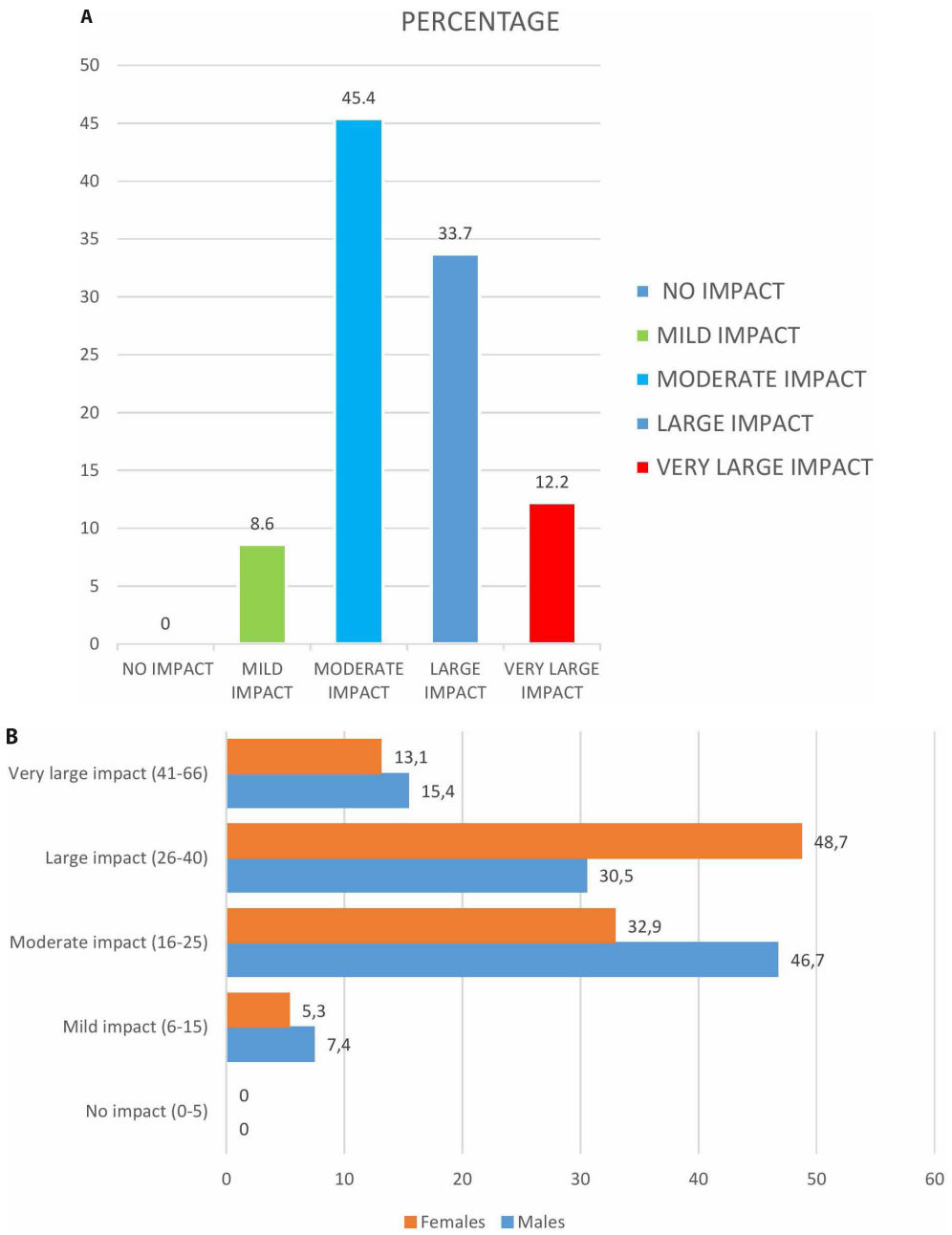

Figure 1. (A) Percentage of patients according to severity grade of impact of VIS-22. (B) Comparison of impact of VIS-22 severity scores in males and females. VIS = vitiligo impact scale.

patterns (4.46±1.22) as compared to males(P value < 0.05). Similarly, the stigma and behavior domains of VitiQol score were statistically significant in the age group of 18-29 years (P value < 0.001) as shown in Table 4.

Figure 3B demonstrates statistically significant weak correlation between VitiQoL and VIDA score with the scores being highest in patients with VIDA score of +4.

Furthermore, Intra class Correlation Coefficient (ICC) was used to evaluate the agreement between VIS-22 and VitiQoL scores (Table 5). A value of 0.842 was obtained which was interpreted as good concordance between the two QOL scores, thereby implicating that both the scores were equivalent in terms of evaluation of QOL in vitiligo.

Conclusions

There is dearth of data regarding association of QOL indicators in vitiligo with the disease activity and area scores in patients of skin of color, particularly in the Indian scenario, in spite of the fact that highest incidence of the disease has been established in India [17]. Kim et al. and Kostopoulou et al. in their studies, have highlighted the fact that in vitiligo, subjective severity is more relevant than physician-rated severity in predicting QOL [18,19]. Therefore, through this study, we attempted to reprise the existing high incidence of impact on QOL using valid disease specific questionnaires among patients with variable demographics.

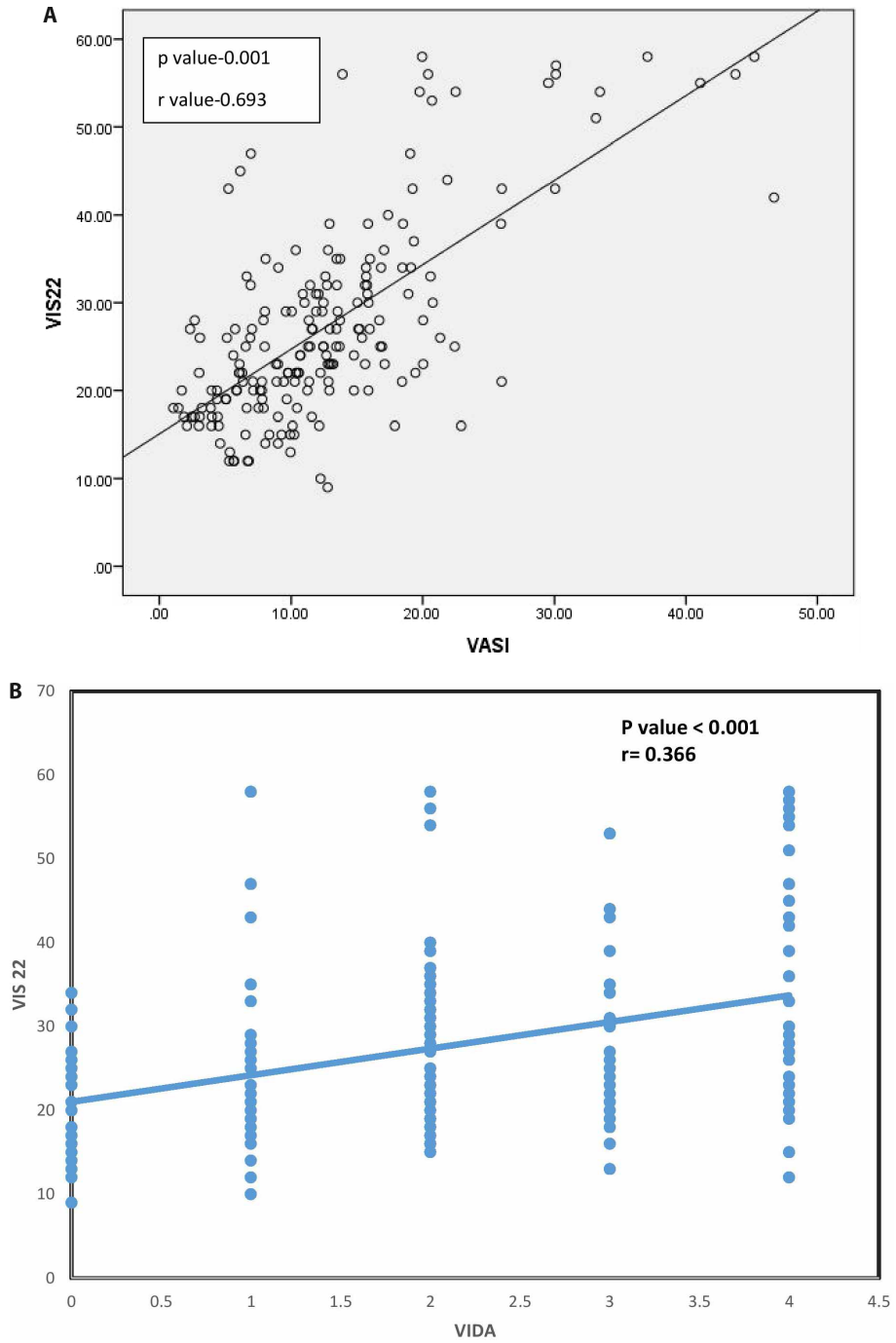

Figure 2. (A) Scatter plot demonstrating the correlation between VIS-22 and VASI score; association of the parameters is shown by solid line (r value-0.693; P value 0.001). (B) Scatter plot demonstrating positive association and significant correlation of VIS-22 with VIDA score; solid line represents the trend line and dotted lines represent the scatter points (r value 0.366; P value < 0.001). VASI = vitiligo area severity index; VIDA = vitiligo disease activity score; VIS = vitiligo impact scale.

Table 2. Correlation of VASI score with VIS-22 score

Mean VIS-22 (27.25±11.19)	VIS-22 0-5 (N=0)	VIS-22 6-15 (N=17)	VIS-22 16-25 (N=89)	VIS-22 26-40 (N=65)	VIS-22 41-66 (N=24)	P value	R value
Mean VASI (12.63±8.06)	0	09.54±5.26	13.18±4.77	25.91±11.84	08.00±2.48	0.001	0.693

VASI = vitiligo area severity index; VIS = vitiligo impact scale.

Table 3. Correlation of VitiQoL score with various demographic variables

VitiQoL		N	VitiQoL mean	Standard deviation of VitiQoL	P value
Gender	F	118	24.3390	12.97942	0.474
	M	77	25.7532	14.15437	
Age	18-29	48	26.6042	14.20330	0.034
	30-39	66	22.3485	9.88004	
	40-49	46	23.0652	12.16991	
	>50	35	29.7714	17.97398	
Duration of disease	<3	78	27.1154	15.16317	0.021
	3-6	56	23.3214	10.84956	
	7-12	31	18.8387	7.16518	
	13-15	18	27.2778	16.73603	
	>15	12	29.9167	15.03002	
Family history	Positive	57	26.0000	13.82027	0.463
	Negative	138	24.4420	13.30058	
Marital status	Divorce	8	29.0000	10.81005	0.564
	Single	70	25.5000	14.94798	
	Married	117	24.2564	12.65807	
Occupation	Student	35	23.2857	12.15723	0.374
	Labour	78	25.5385	13.89075	
	Household worker	36	27.7222	16.52982	
	Semiskilled	27	23.4444	8.89829	
	Skilled	13	19.0769	5.34574	
	Unemployed	6	28.1667	21.02776	
Skin type	Type III	75	26.1733	15.46782	0.186
	Type IV	103	23.3495	11.20899	
	Type V	17	28.6471	15.61626	
Sites	Exposed	41	25.6829	14.66874	0.782
	Covered	70	25.3571	14.49541	
	Exposed+covered	84	24.1310	11.94140	
Individual sites	Scalp	7	27.1429	20.41591	0.283
	Face	17	29.5294	20.11566	
	Chest	25	28.4800	14.23060	
	Abdomen	28	21.1071	9.08943	
	Back	26	26.4615	11.84308	
	UL	47	23.0213	13.18842	
	LL	31	24.4516	11.45961	
	Genital	6	17.6667	3.61478	
	Mucosal	8	28.2500	15.53567	

LL = lower limbs; UL = upper limbs; VitiQoL =Vitiligo Quality of Life Index.

Despite earlier research done by Hedyat et al, Borimnejad et al and Hammam et al[2] establishing that females had a substantially greater influence on QOL, our study found comparable results with no significant differences between the genders in overall mean VIS-22 and VitiQol scores [13,20,21]. This emphasizes the fact that the psychological burden of chronic disorders like vitiligo is alike regardless of gender. This is comparable to the studies done by Aghaei et al in Iran, Patvekar et al and Kota et al in India, who found insignificant variance in QOL impairment between men and women using DLQI scores [22-24]. These variable results might be due to cultural and religious differences between various countries.

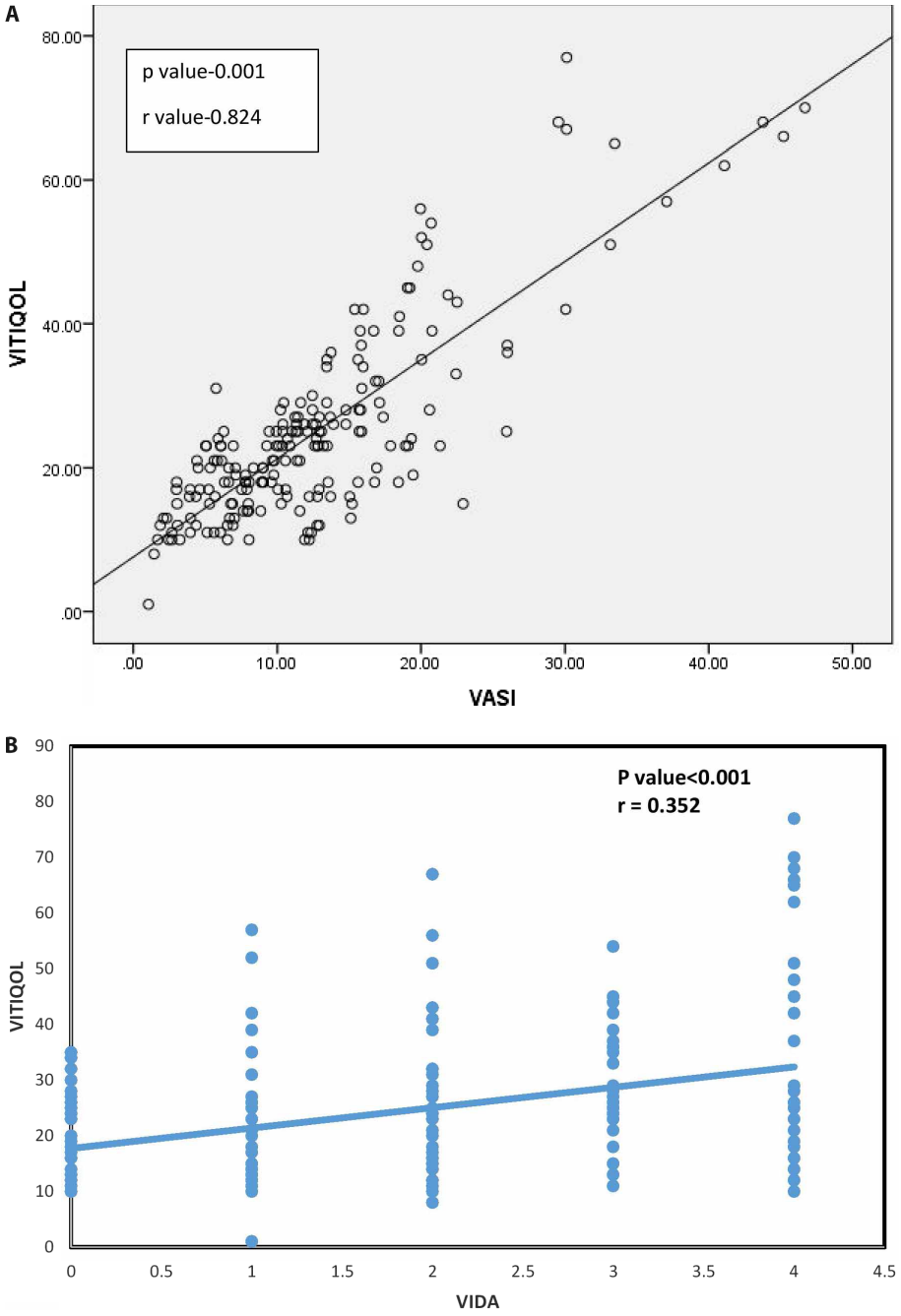

Figure 3. (A) Scatter plot demonstrating correlation among VitiQol and VASI scores; association of the parameters is shown by the solid line. (r value-0.824; P value 0.001). (B) Scatter plot demonstrating positive association and significant correlation of VitiQol with VIDA score; solid line represents the trend line and dotted lines represent the scatter points (r value 0.352; P value <0.001). VASI = vitiligo area severity index; VIDA = vitiligo disease activity score; Vitiligo Quality of Life Index.

Nonetheless, gender-wise impact of VIS-22 in the present study reflected maximum proportion of females (48.7%) to have a large impact on their QOL, unlike maximum proportion of males (46.7%) who had moderate impact. Likewise, upon assessment of the individual VitiQoL domains, it was established that females had higher affliction in two individual domains , participation limitation (P value 0.03) and behavior (P value 0.012). Questions 4, 6, 9 and 14 contributed maximum to the participation limitation scores and questions 8,12 to behavior scores. Considering that vitiligo generates obvious lesions on the skin, this relatively poor QOL in female patients based on behavior component was logically anticipated as they are socially more pressurized, tend to get coerced behaviorally and strive to disguise their patches with camouflage and/or clothing. Furthermore, they exhibit a greater emotional agitation, and the condition has a significant influence on their self-esteem [13,25,26,27,28]. The higher scores of participation limitation found in the present study are contrary to most of the studies done beforehand [13,25,28]. This discrepancy between genders with

Table 4. Descriptive statistics of various domains of Vitiligo Quality of Life Index score according to gender and age groups

	Limited social participation		Stigma		Behavior	
Variables	**Mean**	**Standard deviation**	**Mean**	**Standard deviation**	**Mean**	**Standard deviation**
Sex						
Males	3.80	1.21	4.18	1.92	4.02	1.13
Females	4.21	1.34	4.56	1.27	4.46	1.22
P value	0.03		0.09		0.012	
Age						
18-29	3.63	1.67	4.92	1.45	3.72	1.57
30-39	3.41	1.04	4.19	1.73	2.94	1.03
40-49	3.28	1.22	3.27	1.66	2.48	1.27
>50	3.10	1.12	2.43	1.25	2.14	1.02
P value	0.282		0.001		0.001	

Table 5. Intra-class Correlation Coefficient for VIS-22 and VitiQoL scores (Statistically Significant at p<0.05; CI- Confidence Interval)

Scores	Mean +_SD	Intra Class Correlation	95% CI	P Value
VIS 22	27.25+11.19	0.842	0.784-0.884	0.000
VitiQoL	24.89+13.40			

CI = confidence interval; SD = standard deviation; VIS = vitiligo impact scale
VitiQoL =Vitiligo Quality of Life Index.

regards to participation limitation can be explained by the increased constraints on women in terms of aesthetics, which restrain them to carry out daily and leisure activities as freely as men due to myths pertaining to the disease.

Various other factors that were independent predictors of poor QOL in the present study were early adulthood (18-29 years; statistically significant), prolonged disease duration (>15 years; statistically significant), unskilled profession, single and divorced individuals, skin type V and those having lesions on exposed sites. Among early adulthood patients, the behavior and stigma domains were significantly affected in this study. Most of these results seemed to be consistent with various previous studies done on QOL in vitiligo using various scores wherein the frequently observed indicators of worse QOL were prolonged duration of lesions [18,19], having darker skin type [7,25,30] and lesions on exposed sites apart from other factors such as extensive vitiligo, having psychiatric morbidity and previously treated vitiligo [2,7,14,31]. Poorer QOL in individuals having prolonged disease duration is probably attributable to the chronic nature of disease, relapsing and remitting course, non-compliance to treatment along with the cultural influences pertaining to indigenous practices of medicine and assumptions about incurability of vitiligo.

Both men and women with white patches over skin have been considered inappropriate for marriage since time immemorial, and emergence of patches have been cited as grounds for divorce [29,32]. Five out of eight divorced patients professed to vitiligo being the ground for divorce in this study. It is noteworthy that vitiligo impacts not only the diseased individual but also the QOL of their family members including partners [17]. L Al-Mubarak et al in their study inferred that married people QOL was not as poorly influenced as that of single people, similar to the present study wherein both VIS-22 and VitiQoL scores were higher in single patients as the disease probably instils a fear of rejection and decreased future prospects of marriage [33]. Higher values of both QOL scores in household workers and laborers in this study, as compared to lower scores in patients with skilled occupations, signifies the importance of education in reducing the impact of chronic diseases on the individual psychological impairment.

Both the VIS-22 and VitiQoL scores exhibited a statistically significant association with VIDA score (P value<0.001, r value 0.367 and 0.353 respectively), asserting that higher disease activity corresponds to poorer QOL. The only other study done so far comparing VIDA with QOL scores showed statistically insignificant, weakly positive association between VIDA score and DLQI [34].

Gupta et al grouped the questions of VIS 22 in 10 domains comprising attitude, anxiety, social interaction, occupation and so forth [12]. While assessing these individual domains,

the questions related to social interactions (3, 12, 13) and anxiety (2, 11) were found to be the major contributors to the scores in the present study, specifically among those who had lesions on the exposed sites.

Upon severity assessment of VIS-22, 45.4 % patients reflected moderate impact and 33.7 % had large impact on their QOL, both comprising of the largest burden (79.1%) of the study group, hence reiterating that vitiligo has considerable affliction on QOL. Likewise, Gupta et al, in a study of cohort of 391 vitiligo patients, noted 49.7% patients had large impact on QOL followed by mild impact in 27.7 % patients using VIS 22 scores [16].

Higher mean values of VASI score observed in patients who had moderate to large impact on their QOL (P value 0.001; r value 0.693)according to VIS-22 score, demonstrated that more the disease severity, higher the impact on QOL. Similar results were seen by Hammam at al in study done on QOL using DLQI scores [21].

Statistically significant correlation demonstrated in this study between both VIS-22 and VitiQoL with VASI scores (P value 0.001) infers that QOL seemed to be remarkably dependent on the clinical severity scores. Correlation of VitiQoL score with VASI score was slightly higher (r value 0.824,very strong correlation) than with VIS 22 score (r value 0.693,s trong correlation). Studies done antecedently corroborating this relationship between QOL and area severity scores are Hammam et al (DLQI and VASI), Patvekar et al (VASI and VIS-22), Hedyat et al (VASI and VitiQol) and several others [9,13,19,21,22,24,35,36,37,38]. Contrarily, Kota et al in their study established significant correlation of VASI with DLQI but poor correlation with VIS-22 scores [23].

Since neither of the two QOL scores (VIS-22 and VitiQoL) was determined to be superior to the other (ICC 0.842), each of these scores is viable for utilization in skin of color to measure the impact of vitiligo on QOL.

Since it was a hospital-based study, extrapolation of this data at community level may not be representative of the actual disease burden. Moreover, it was a questionnaire-based study lacking any control group. Furthermore, the study population was representative of a group where cultural beliefs and myths pose a greater psychological burden which may not coincide with global figures. The scoring was performed at one point in time and test-retest measurements could not be performed.

In this study, both disease specific QOL scores were compared and correlated with disease severity assessment tools in Indian patients. Additionally, our study emphasizes the importance for dermatologists to integrate QOL assessments in management of vitiligo, in order to assess the extent of activity limitation and psychological burden.

Our data emphasizes the utility of various vitiligo specific QOL scores along with their various domains and graded impact scales. Preliminary psychological screening may assist in timely engagement with multidisciplinary approaches and mental health experts to mitigate the health burdens for these patients. Future prospective studies should focus on identifying inherent fundamental factors in mental health in order to bridge gaps in psychological support to the patients.

Acknowledgement

We thank Dr. M Ramam and Dr. Vishal Gupta, Department of Dermatology, AIIMS, New Delhi, for granting us permission for using VIS-22.

References

1. Njoo MD, Westerhof W. Vitiligo pathogenesis and treatment. *Am J Clin Dermatol.* 2001;2(3):167-181. DOI: 10.2165/00128071-200102030-00006. PMID: 11705094.
2. Parsad D, Dogra S, Kanwar AJ. Quality of life in patients with vitiligo. *Health Qual Life Outcomes.* 2003;1:58. DOI: 10.1186/1477-7525-1-58. PMID: 14613564. PMCID: PMC269995.
3. Amer AA, Gao XH. Quality of life in patients with vitiligo: an analysis of the dermatology life quality index outcome over the past two decades. *Int J Dermatol.* 2016;55(6):608-614. DOI: 10.1111/ijd.13198. PMID: 26749040.
4. Malhotra N, Dytoc M. The pathogenesis of vitiligo. *J Cutan Med Surg.* 2013;17(3):153-172. DOI: 10.2310/7750.2012.12005. PMID: 23673299.
5. Hamzavi I, Jain H, McLean D, Shapiro J, Zeng H, Lui H. Parametric modeling of narrowband UV-B phototherapy for vitiligo using a novel quantitative tool: the Vitiligo Area Scoring Index. *Arch Dermatol.* 2004;140(6):677-683. DOI: 10.1001/archderm.140.6.677. PMID: 15210457.
6. Njoo MD, Das PK, Bos JD, Westerhof W. Association of the Koebner phenomenon with disease activity and therapeutic responsiveness in Vitiligo Vulgaris. *Arch Dermatol.* 1999;135(4):407-413. DOI: 10.1001/archderm.135.4.407. PMID: 10206047.
7. Mattoo SK, Handa S, Kaur I, Gupta N, Malhotra R. Psychiatric morbidity in vitiligo: prevalence and correlates in India. *J Eur Acad Dermatol Venereol.* 2002;16(6):573-857. DOI: 10.1046/j.1468-3083.2002.00590.x. PMID: 12482039.
8. Porter JR, Beuf AH, Lerner A, Nordlund J. Psychosocial effect of vitiligo: a comparison of vitiligo patients with "normal" control subjects, with psoriasis patients, and with patients with other pigmentary disorders. *J Am Acad Dermatol.* 1986;15(2 Pt 1):220-224. DOI: 10.1016/s0190-9622(86)70160-6. PMID: 3745526.
9. Wang KY, Wang KH, Zhang ZP. Health-related quality of life and marital quality of vitiligo patients in China. *J Eur Acad Dermatol Venereol.* 2011;25(4):429-435. DOI: 10.1111/j.1468-3083.2010.03808.x. PMID: 20666878.
10. Talsania N, Lamb B, Bewley A. Vitiligo is more than skin deep: a survey of members of the Vitiligo Society. *Clin Exp Dermatol.* 2010;35(7):736-739. DOI: 10.1111/j.1365-2230.2009.03765.x. PMID: 20015281.
11. Kent G, al-Abadie M. Factors affecting responses on Dermatology Life Quality Index items among vitiligo sufferers. *Clin Exp Dermatol.* 1996;21(5):330-333. PMID: 9136149.

12. Gupta V, Sreenivas V, Mehta M, Khaitan BK, Ramam M. Measurement properties of the Vitiligo Impact Scale-22 (VIS-22), a vitiligo-specific quality-of-life instrument. *Br J Dermatol*. 2014;171(5):1084-1090. DOI: 10.1111/bjd.13093. PMID: 24805089.
13. Hedayat K, Karbakhsh M, Ghiasi M, et al. Quality of life in patients with vitiligo: a cross-sectional study based on Vitiligo Quality of Life index (VitiQoL). *Health Qual Life Outcomes*. 2016;14:86. DOI: 10.1186/s12955-016-0490-y. PMID: 27267598. PMCID: PMC4897932.
14. Lilly E, Lu PD, Borovicka JH, et al. Development and validation of a vitiligo-specific quality-of-life instrument (VitiQoL). *J Am Acad Dermatol*. 2013;69(1):e11-e18. DOI: 10.1016/j.jaad.2012.01.038. PMID: 22365883.
15. Krishna GS, Ramam M, Mehta M, Sreenivas V, Sharma VK, Khandpur S. Vitiligo impact scale: An instrument to assess the psychosocial burden of vitiligo. *Indian J Dermatol Venereol Leprol*. 2013;79(2):205-210. DOI: 10.4103/0378-6323.107637. PMID: 23442459.
16. Gupta V, Sreenivas V, Mehta M, Ramam M. What do Vitiligo Impact Scale-22 scores mean? Studying the clinical interpretation of scores using an anchor-based approach. *Br J Dermatol*. 2019;180(3):580-585. DOI: 10.1111/bjd.17040. PMID: 30085349.
17. Agarwal S, Jain C, Shaafie HI, Khalid A, Singh A. Impact on quality of life of family members of vitiligo patients in North India: A cross-sectional study using family dermatology life quality index. *Indian J Dermatol Venereol Leprol*. 2021;87(6):869-872. DOI: 10.25259/IJDVL_933_20. PMID: 34672480.
18. Kim DY, Lee JW, Whang SH, Park YK, Hann SK, Shin YJ. Quality of life for Korean patients with vitiligo: Skindex-29 and its correlation with clinical profiles. *J Dermatol*. 2009;36(6):317-322. DOI: 10.1111/j.1346-8138.2009.00646.x. PMID: 19500179.
19. Kostopoulou P, Jouary T, Quintard B, et al. Objective vs. subjective factors in the psychological impact of vitiligo: the experience from a French referral centre. *Br J Dermatol*. 2009;161(1):128-133. DOI: 10.1111/j.1365-2133.2009.09077.x. PMID: 19298280.
20. Borimnejad L, Parsa Yekta Z, Nikbakht-Nasrabadi A, Firooz A. Quality of life with vitiligo: comparison of male and female muslim patients in Iran. *Gend Med*. 2006;3(2):124-130. DOI: 10.1016/s1550-8579(06)80201-9. PMID: 16860271.
21. Hammam MA, Yasien HA, Algharably AF. Effect of Vitiligo Area Scoring Index on the quality of life in patients with vitiligo. *Menoufia Med J*. 2019;32:244-249. DOI: 10.4103/mmj.mmj_399_17.
22. Aghaei S, Sodaifi M, Jafari P, Mazharinia N, Finlay AY. DLQI scores in vitiligo: reliability and validity of the Persian version. *BMC Dermatol*. 2004;4:8. DOI: 10.1186/1471-5945-4-8. PMID: 15294022. PMCID: PMC514558.
23. Patvekar MA, Deo KS, Verma S, Kothari P, Gupta A. Quality of life in vitiligo: Relationship to clinical severity and demographic data. *Pigment Int*. 2017;4:104-108. DOI: 10.4103/2349-5847.219684.
24. Kota RS, Vora RV, Varma JR, Kota SK, Patel TM, Ganjiwale J. Study on Assessment of Quality of Life and Depression in Patients of Vitiligo. *Indian Dermatol Online J*. 2019;10(2):153-157. DOI: 10.4103/idoj.IDOJ_14_18. PMID: 30984590. PMCID: PMC6434757.
25. Dolatshahi M, Ghazi P, Feizy V, Hemami M. Life quality assessment among patients with vitiligo: Comparison of married and single patients in Iran. *Indian J Dermatol Venereol Leprol*. 2008;74(6):700. DOI: 10.4103/0378-6323.45141. PMID: 19177700.
26. Do Bú EA, Alexandre MES, Scardua A, Araújo CRF. Vitiligo as a psychosocial disease: apprehensions of patients imprinted by the white. Interface - *Comunicação, Saúde, Educação*. 2018;22(65):481-491. DOI: 10.1590/1807-57622016.0925.
27. Simons RE, Zevy DL, Jafferany M. Psychodermatology of vitiligo: Psychological impact and consequences. *Dermatol Ther*. 2020;33(3):e13418. DOI: 10.1111/dth.13418. PMID: 32297399.
28. Revista de Psicologia da IMED, Passo Fundo, vol. 13, n. 1, p. 264-282, janeiro-junho, 2021 - ISSN 2175-5027 Submetido: julho 29, 2020; Revisão: agosto 10, 2020 Aceito: agosto 26, 2020; Publicado: agosto 18, 2021
29. Radtke MA, Schäfer I, Gajur A, Langenbruch A, Augustin M. Willingness-to-pay and quality of life in patients with vitiligo. *Br J Dermatol*. 2009;161(1):134-139. DOI: 10.1111/j.1365-2133.2009.09091.x. PMID: 19298268.
30. Linthorst Homan MW, Spuls PI, de Korte J, Bos JD, Sprangers MA, van der Veen JP. The burden of vitiligo: patient characteristics associated with quality of life. *J Am Acad Dermatol*. 2009;61(3):411-420. DOI: 10.1016/j.jaad.2009.03.022. PMID: 19577331.
31. Choi S, Kim DY, Whang SH, Lee JH, Hann SK, Shin YJ. Quality of life and psychological adaptation of Korean adolescents with vitiligo. *J Eur Acad Dermatol Venereol*. 2010;24(5):524-529. DOI: 10.1111/j.1468-3083.2009.03452.x. PMID: 19807826.
32. Alikhan A, Felsten LM, Daly M, Petronic-Rosic V. Vitiligo: a comprehensive overview Part I. Introduction, epidemiology, quality of life, diagnosis, differential diagnosis, associations, histopathology, etiology, and work-up. *J Am Acad Dermatol*. 2011;65(3):473-491. DOI: 10.1016/j.jaad.2010.11.061. PMID: 21839315.
33. Al-Mubarak L, Al-Mohanna H, Al-Issa A, Jabak M, Mulekar SV. Quality of life in Saudi vitiligo patients. *J Cutan Aesthet Surg*. 2011;4(1):33-37. DOI: 10.4103/0974-2077.79188. PMID: 21572679 PMCID: PMC3081482.
34. Belgaumkar VC,, Ravindranath D, Nupur NW. . Impact of Vitiligo on Quality of Life: A Cross-sectional Pilot Study from Western India. *Journal of Skin and Stem Cell*. 2020;7. DOI: 10.5812/jssc.107184.
35. Mechri A, Amri M, Douarika AA, Ali Hichem BH, Zouari B, Zili J. Morbidite psychiatrique et qualite de vie des patients atteints du vitiligo: etude cas-temoins [Psychiatric morbidity and quality of life in Vitiligo: a case controlled study]. *Tunis Med*. 2006;84(10):632-635. PMID: 17193855.
36. Karelson M, Silm H, Kingo K. Quality of life and emotional state in vitiligo in an estonian sample: Comparison with psoriasis and healthy controls. *Acta Derm Venereol*. 2013;93(4):446-450. DOI: 10.2340/00015555-1520. PMID: 23306792.
37. Sangma LN, Nath J, Bhagabati D. Quality of life and psychological morbidity in vitiligo patients: a study in a teaching hospital from north-East India. *Indian J Dermatol*. 2015;60(2):142-146. DOI: 10.4103/0019-5154.152508. PMID: 25814701. PMCID: PMC4372905.
38. Silverberg JI, Silverberg NB. Association between vitiligo extent and distribution and quality-of-life impairment. *JAMA Dermatol*. 2013;149(2):159-164. DOI: 10.1001/jamadermatol.2013.927. PMID: 23560296.