



Comprehensive Evaluation of Psychosocial Sequelae and Quality of Life Alterations in Vitiligo Patients Employed in Indian Government Sectors: A Pre- and Post-Therapeutic Analysis

Kumar V^{1,2}, Kapoor R³, Gulhane A⁴, Shome D^{4*}, Khot AJP⁴, Mhatre P¹ and Bellani D¹

¹Department of Research, The Esthetic Clinics, Mumbai, Maharashtra, India

²Department of Public Health Dentistry, GD Pol Foundation YMT Dental College and Hospital, Navi Mumbai, India

³Department of Dermatology, Cosmetic Dermatology & Dermato-Surgery, India

⁴Department of Facial Plastic Surgery and Facial Cosmetic Surgery, The Esthetic Clinics, Mumbai, Maharashtra, India

Abstract

Aim and Background: Vitiligo, an acquired dermatosis characterized by the autoimmune-mediated destruction of melanocytes, significantly compromises the Quality of Life (QoL) of affected individuals, particularly regarding psychological well-being. This detrimental impact is markedly exacerbated among government employees in India, where societal stigma and conspicuous disfigurement intensify psychological distress.

Methodology: This descriptive cross-sectional pilot study was conducted across multiple dermatological institutions in Maharashtra, India, involving a cohort of 430 government employees afflicted with vitiligo undergoing therapeutic interventions. Assessment was conducted utilizing four validated psychometric instruments: the Dermatology Life Quality Index (DLQI), Vitiligo Impact Scale-22 (VIS-22), Toronto Alexithymia Scale-20 (TAS-20), and Vitiligo Quality of Life (VitiQoL). Data were meticulously analyzed using IBM SPSS® Statistics for Windows Version 21.0.

Results: The mean scores were DLQI at 21.79, VIS-22 at 49.54, TAS-20 at 67.86, and VitiQoL at 45.44. Notably, comparative analysis revealed significant pre- and post-treatment score differentials: DLQI improved by 3.32 points, VIS-22 by 30 points, TAS-20 by 14.83 points, and VitiQoL increased by 60.35 points. These findings elucidate a substantial attenuation of the psychosocial burden associated with vitiligo following therapeutic intervention and a concomitant enhancement in overall QoL.

Conclusion: The results underscore the imperative for targeted interventions that encompass comprehensive psychological support and evidence-based strategies to mitigate disease progression among government employees afflicted with vitiligo, thereby addressing both the somatic and psychosocial dimensions of this condition.

Keywords: Vitiligo; Depigmented patches; Psychological impact; Quality of Life

Introduction

The government service sector in India functions as a critical nexus for the public health infrastructure, serving as a primary filtration mechanism for healthcare access and delivery. This sector encompasses a heterogeneous array of entities, including income tax offices, governmental properties, judicial institutions, law enforcement agencies, public hospitals, and financial institutions. Each of these components significantly contributes to the operational efficacy and systemic performance of public health services. However, with augmented responsibility arises an increase in occupational stressors.

Kumar et al. [1] elucidate those societal perceptions predominantly reflect a proclivity towards government employment over private sector opportunities, primarily attributable to the perceived security and stability inherent in public service positions. This intricate interplay between job

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*Correspondence:

Debraj Shome, Department of Facial Plastic Surgery and Facial Cosmetic Surgery, The Esthetic Clinics, Mumbai, Maharashtra, India, Tel: +91 7400250158;

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security and public service underscores the necessity for robust support systems within the government sector to mitigate stressors that may adversely affect employee well-being and, consequently, public health outcomes. The systemic challenges inherent in this framework necessitate a concerted effort to enhance operational efficiency while concurrently addressing the psychosocial needs of government employees engaged in public health delivery. Such initiatives are imperative to sustain the integrity and effectiveness of India's healthcare infrastructure amidst evolving demands and societal expectations.

Vitiligo is a chronic dermatological affliction characterized by the autoimmune-mediated obliteration of melanocytes, culminating in the formation of depigmented macules and patches on the integument and mucous membranes [2]. This disorder may present in either segmental or generalized forms, affecting individuals across the gender spectrum, with a typical onset during the second or third decade of life. The global prevalence of vitiligo is estimated to range from 0.5% to 1.8%, with a mean prevalence approximating 0.6%. In contrast, the incidence within the Indian subcontinent is significantly elevated, reported to be between 3% and 4%, with certain epidemiological studies documenting prevalence rates as high as 8.8% [3-5].

Vitiligo is a multifaceted dermatological disorder characterized by the progressive and selective depigmentation of the epidermis, attributable to an autoimmune-mediated cytotoxic response targeting melanocytes, the specialized cells responsible for the biosynthesis of melanin [6,7]. This condition manifests as well-circumscribed macules or patches of achromic skin, predominantly localized in areas of heightened exposure, such as the periorificial regions, acral surfaces (notably the dorsal aspects of the hands and feet), and genitocrural zones [8,9].

The phenotypic expression of vitiligo is marked by considerable heterogeneity, with variations in both the extent and distribution of depigmented lesions. The condition can be delineated into distinct subtypes, including generalized vitiligo, characterized by bilateral symmetry and progressive dissemination, and segmental vitiligo, which typically exhibits unilateral distribution and may demonstrate a more stable course post-onset.

The stark contrast between depigmented regions and surrounding pigmented skin engenders significant psychosocial ramifications, particularly in individuals with higher melanin content, where the aesthetic impact is markedly pronounced [10]. This psychological burden is further exacerbated by the potential comorbidity with other autoimmune pathologies, necessitating a comprehensive multidisciplinary approach to management that encompasses both somatic and psychosocial dimensions.

The psychological ramifications of vitiligo on affected individuals, particularly those employed in the government sector, are profound and multifaceted, significantly influencing their behavioural patterns and self-efficacy in daily activities [11]. While not life-threatening, vitiligo presents a substantial cosmetic challenge that detrimentally impacts emotional and psychological well-being.

Patients frequently grapple with heightened feelings of embarrassment and diminished self-esteem, largely stemming from societal stigmatization and adverse perceptions of their condition [12]. This stigma can lead to social ostracism, derogatory remarks, and discrimination, which exacerbate the prevalence of anxiety and

depressive disorders among this population. The emotional toll of vitiligo underscores the necessity for an integrative approach that addresses both the physical manifestations of the disease and its psychosocial implications, facilitating improved quality of life and functional outcomes for patients navigating the complexities of living with this condition [13].

The psychological encumbrance of vitiligo profoundly disrupts occupational performance and obstructs career trajectories. Affected individuals frequently exhibit augmented absenteeism necessitated by medical consultations and therapeutic interventions, thereby undermining their perceived reliability within professional settings [14]. In governmental roles, the conspicuous manifestations of vitiligo can detrimentally influence professional ascension and job security, as overt depigmentation may invoke biases regarding competence and capability [15].

Numerous patients articulate that their condition circumscribes vocational opportunities and engenders deleterious perceptions among colleagues and superiors. The pervasive trepidation of being scrutinized based on one's appearance can catalyse anxiety during interviews and public engagements, further constraining professional avenues [16].

Anxiety disorders, typified by pervasive apprehension and hyperreactivity to ostensibly threatening stimuli, are disproportionately prevalent among individuals with vitiligo compared to the general populace [17]. This psychological distress exhibits considerable heterogeneity, modulated by individual circumstances, societal constructs, and occupational environments. Nevertheless, there exists a conspicuous paucity of exhaustive inquiries that dissect this phenomenon through both integrative theoretical paradigms and rigorous empirical substantiation.

This study rigorously investigates the psychological sequelae and comprehensive Quality of Life (QoL) metrics of vitiligo patients employed within the Indian government sector, both during and subsequent to therapeutic interventions. By employing this analytical framework, we endeavour to elucidate the salient role of psychosocial determinants within the vitiligo paradigm, thereby advocating for an empirically substantiated approach tailored to the distinctive exigencies of this patient demographic.

Our aim is to delineate the complex interplay between psychosocial stressors and the lived experiences of individuals afflicted with vitiligo, particularly concerning their occupational functionality and emotional well-being. Through a synthesis of qualitative and quantitative methodologies, we aspire to contribute to a nuanced understanding of how vitiligo not only undermines aesthetic integrity but also precipitates substantial psychosocial distress that can compromise professional efficacy and personal fulfilment.

Materials and Methods

This descriptive cross-sectional pilot study was conducted in adherence to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) [18] guidelines at multiple dermatological institutions catering to government employees afflicted with vitiligo across various districts in Maharashtra, India.

The study population comprised individuals diagnosed with vitiligo, and data collection involved meticulous documentation of clinical, sociodemographic, and psychosocial parameters. A comprehensive approach was employed to assess the multifaceted

impact of vitiligo on quality of life and psychological well-being, integrating both qualitative and quantitative methodologies.

Ethical approval was obtained from relevant Institutional review boards, and informed consent was secured from all participants prior to enrolment.

Participants

A multi-stage random sampling methodology was meticulously orchestrated for this investigation, encompassing a cohort of 430 participants diagnosed with vitiligo who were actively engaged in therapeutic interventions throughout the designated study period. No restrictions were imposed regarding the participants' sex, occupational classification, or socioeconomic stratification, thereby facilitating a representative sample reflective of the broader demographic spectrum.

Inclusion criteria

The study incorporated government employees aged 18 years or older, presenting with a clinical diagnosis of vitiligo persisting for a duration exceeding two years.

Exclusion criteria

Systematic exclusion criteria were rigorously applied to individuals who were pregnant or lactating, thereby mitigating potential confounding variables associated with gestational or postpartum psychological stressors. Furthermore, individuals with a documented history of psychiatric disorders were excluded to uphold the methodological integrity of psychological assessments and to delineate the specific psychosocial ramifications of vitiligo on quality of life and mental health outcomes. This stringent selection protocol was instituted to enhance methodological robustness and ensure the veracity and reliability of the resultant findings.

Questionnaire framework

Four questionnaire scores were used for comparison as follows:

1. Dermatology Life Quality Index (DLQI): 10 questions with responses (Very much, A lot, A little, Not at all)
2. Vitiligo Impact Scale-22 (VIS-22): 22 questions with responses (Very much, A lot, A little, Not at all)
3. Toronto Alexithymia Scale-20 (TAS): 20 questions with responses (strongly disagree, disagree, agree, strongly agree)
4. Vitiligo-specific health-related quality of life (VitiQoL): 16 questions with responses (Rarely, Occasionally, Sometimes, Frequently, Usually, All the same)

Scores were obtained from each scale-based response and assessed further. A comparison tabular format was utilised to calculate the statistical significance for each scale ($p < 0.005$: statistically significant, and $p < 0.001$: highly statistically significant). The questionnaire framework is being tabulated in the tables below

Screening and sample collection

The patients were screened at baseline via a thorough physical examination. The patients diagnosed with Vitiligo were included in the study. After screening, a patient information sheet was given to the patients, and informed consent was taken. The patients were administered 4 pre-validated questionnaires: the DLQI, VIS-22, TAS-20, and VitiQoL scale, and their demographic data, such as age, gender, geographical area, and the type of vitiligo, was recorded.

Following data collection at baseline, the patients were administered the appropriate treatment, depending on the type and extent of vitiligo. This treatment was continued for a span of 6 months. At the end of the treatment, the patients were administered the same set of questionnaires to record any change in their responses post-treatment.

Statistical analysis

Data obtained was entered in Microsoft Excel 2020 and subjected to statistical analysis by a blinded statistician, analysed using IBM SPSS® Statistics for Windows Version 21.0. Armonk, NY: IBM Corp. The descriptive statistics were presented as mean \pm standard deviation for continuous variables and as frequencies with percentages for categorical variables. The normality of the distribution of the continuous variables was determined using the Shapiro-Wilk test. Chi-square analyses were carried out to evaluate the responses based on various assessment scales among Vitiligo patients. A Wilcoxon Sign-Rank test was applied to compare the Vitiligo pre- and post-treatment. The relation between socio-demographic variables and different Vitiligo assessment scales was conducted by multiple linear regression analysis. Statistical significance was set at $p \leq 0.05$.

Results

A total of 430 vitiligo patients working in a government sector were included in this study with an average age of 46 years (18-74 yrs; SD: 39.6 yrs) (Figure 1 (A)). The majority of participants ($n=183$) were between 35 and 44 years of age, followed by 45 to 64 years ($n=122$), 18 to 34 years ($n=72$), and 65 to 74 years ($n=53$). Equal distribution was witnessed between males (51.2%) and females (48.8%) (Figure 2(B)).

Nearly half of the government participants ($n=199$) were from rural areas (Figure 1 (C)), whereas similar involvement was witnessed from semi-urban ($n=123$) and urban areas ($n=108$). Focal ($n=119$) and segmental ($n=117$) vitiligo were the most common types of vitiligo amongst included participants (Figure 1 (D)).

The mean DLQI score was 21.79 (Pre-treatment: 23.45; Post-treatment: 20.13). The highest score was achieved by the questions related to clothing (1.2), social activity (1.1) and embarrassment (1.4) ($p < 0.001$) (Table 1).

The mean VIS-22 score was 49.54 (Pre-treatment: 34.54; Post-treatment: 64.54). Majority of agreement (A lot; Very much) was witnessed in questions related to other people's opinion ($n=291$; 67.7%), if disease is spread by touch ($n=383$; 89.1%), if parents insist on seeking treatment ($n=430$; 100%) and whether in-laws worry ($n=375$; 87.1%) (Table 2).

The mean TAS-20 score is 67.86 (Pre-treatment: 75.27; Post-treatment: 60.44) (Figure 1). Participants showed agreement (Agree; Strongly Agree) to the questions related to describing their feelings in their own words ($n=361$; 84%), being unable to identify the feelings ($n=430$; 100%) and preferring 'light' entertainment in place of psychological dramas ($n=415$; 96.5%) (Table 3).

The mean VitiQoL score was 45.44 (Pre-treatment: 75.61; Post-treatment: 15.26) (Figure 1). The most common factors were embarrassment of skin appearance ($n=430$; 100%), frustration about skin appearance ($n=430$; 100%), difficulty in showing affection ($n=430$; 100%), difficulty in making new friends and social connections ($n=430$; 100%), worry about the disease progression ($n=430$; 100%) and effect on grooming practices ($n=430$; 100%) (Table 4).

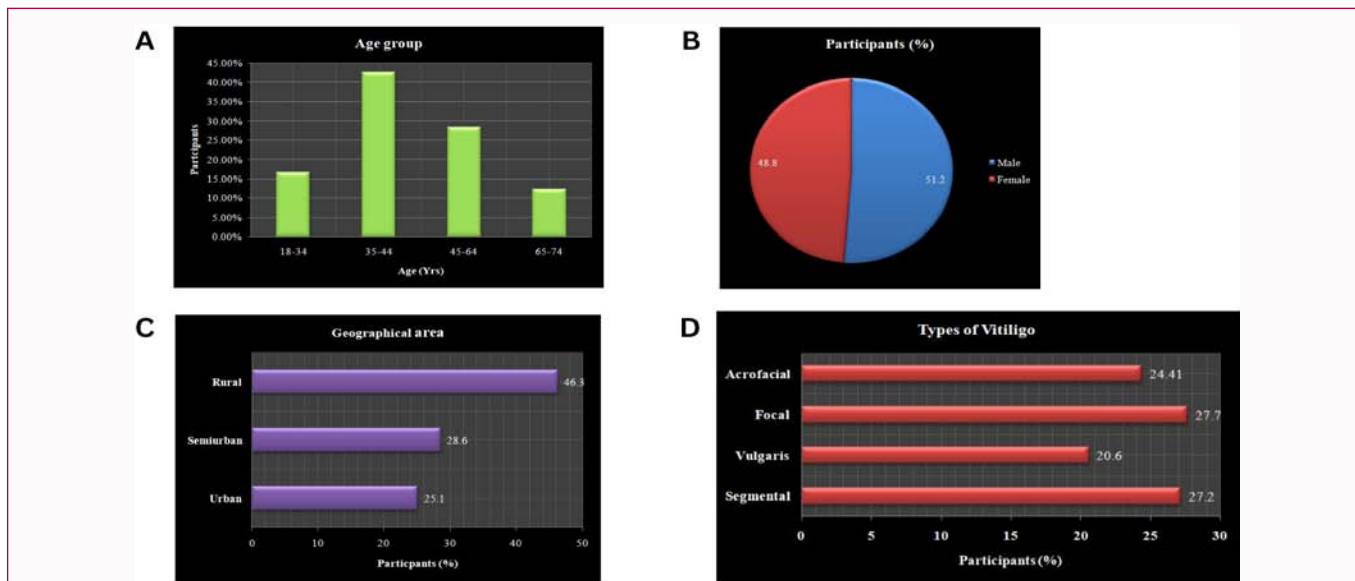


Figure 1: Socio-demographic characteristics of the participants; (A): Age group of the included participants; (B): Gender distribution; (C): Geographical area; (D) Types of Vitiligo

Table 1: Comparison of Dermatology Life Quality Index (DLQI)score pre and post Vitiligo treatment of the patients; DLQI score is obtained as: 0–1=no effect, 2–5=small effect, 6–10=moderate effect, 11–20=very large effect, and 21–30=extremely large effect

Sr. No	Questions	Response frequencies n (%)			p-Value
		Response	Pre	Post	
1	Over the last week, how itchy, sore, painful or stinging has your skin been	Very much	0	0	<0.001**
		A lot	197 (45.8)	0	
		A little	190 (44.2)	322	
		Not at all	43 (10)	108	
2	Over the last week, how embarrassed or self-conscious have you been because of your skin	Very much	0	0	<0.001**
		A lot	85 (19.8)	115 (26.7)	
		A little	257 (59.8)	192 (44.7)	
		Not at all	88 (20.5)	123 (28.6)	
3	Over the last week, how much has your skin interfered with you going shopping or looking after your home or garden	Very much	0	0	<0.001**
		A lot	135 (31.4)	86 (26.7)	
		A little	220 (51.2)	270 (62.8)	
		Not at all	75 (17.4)	74 (17.2)	
4	Over the last week, how much has your skin influenced the ' clothes you wear?	Very much	0	0	<0.001**
		A lot	23 (5.3)	88 (20.5)	
		A little	183 (42.6)	295 (68.6)	
		Not at all	224 (52.1)	47 (10.9)	
5	Over the last week, how much has your skin affected any social or leisure activities?	Very much	0	0	0.024*
		A lot	254 (59.1)	0	
		A little	176 (40.9)	155 (36)	
		Not at all	0	275 (64)	
6	Over the last week, how much has your skin made it difficult for you to do any sport?	Very much	249 (57.9)	26 (6)	<0.001**
		A lot	181 (42.1)	357 (83)	
		A little	0	47 (10.9)	
		Not at all	0	0	
7	Over the last week, has your skin prevented you from working or studying?	Very much	0	0	<0.001**
		A lot	309 (71.9)	100 (23.3)	
		A little	121 (28.1)	330 (76.7)	
		Not at all	0	0	

8	Over the last week, how much has your skin created problems with your partner or any of your close friends or relatives?	Very much	253 (58.8)	0	0.019*
		A lot	177 (41.2)	0	
		A little	0	374 (87)	
		Not at all	0	56 (13)	
9	Over the last week, how much has your skin caused any sexual difficulties?	Very much	71 (16.5)		<0.001**
		A lot	183 (42.6)	235 (54.7)	
		A little	120 (27.9)	162 (37.7)	
		Not at all	56 (13)	33 (7.7)	
10	Over the last week, how much of a problem has the treatment for your skin been, for example by making your home messy, or by taking up time?	Very much	182 (42.3)	0	<0.001**
		A lot	248 (57.7)	0	
		A little	0	248 (57.67)	
		Not at all	0	182 (42.32)	

All values are expressed as the frequency with percentages (in parentheses); The statistical test used: Chi-square test; level of significance: *p<0.05 is considered statistically significant; **p<0.001 is considered highly significant association

Table 2: Comparison of Vitiligo Impact Scale-22 (VIS-22) score pre and post vitiligo treatment of the patients.

Sr. No	Questions	Response frequencies n (%)			p-Value
		Response	Pre	Post	
1	Do you think this disease is incurable?	Very much	102 (23.7)	0	<0.001**
		A lot	206 (47.9)	89 (20.7)	
		A little	102 (23.7)	205 (47.7)	
		Not at all	0	136 (31.6)	
2	Do you change your doctor	Very much	0	0	<0.001**
		A lot	39 (9.1)	66 (15.3)	
		A little	225 (52.3)	183 (42.6)	
		Not at all	166 (38.6)	181 (42.1)	
3	Do suggestions and advice from others about the disease bother you	Very much	168 (39.1)	0	<0.001**
		A lot	123 (28.6)	185 (43)	
		A little	139 (32.3)	231 (53.7)	
		Not at all	0	14 (3.3)	
4	Do other people feel that this disease spreads by touch	Very much	171 (39.8)	0	0.063
		A lot	212 (49.3)	158 (36.7)	
		A little	47 (10.9)	225 (52.3)	
		Not at all	0	47 (10.9)	
5	Do you have problems in wearing your choice of clothes	Very much	132 (30.7)	0	0.951
		A lot	215 (50)	0	
		A little	83 (19.3)	217 (50.5)	
		Not at all	0	213 (49.5)	
6	Do you feel helpless	Very much	29 (6.7)	0	<0.001**
		A lot	177 (41.2)	29 (6.7)	
		A little	201 (46.7)	225 (52.3)	
		Not at all	23 (5.3)	176 (40.9)	
7	Do you face difficulties in adhering to the treatment?	Very much	66 (15.3)	0	<0.001**
		A lot	238 (55.3)	57 (13.3)	
		A little	109 (25.3)	248 (57.7)	
		Not at all	17 (4)	125 (29.1)	
8	Do your parents keep asking you to seek treatment	Very much	202 (47)	65 (15.1)	<0.001**
		A lot	202 (53)	264 (61.4)	
		A little	0	101 (23.5)	
		Not at all	0	0	

9	Do you feel life is not worth living with this disease	Very much	14 (3.3)	0	<0.001**
		A lot	39 (9.1)	0	
		A little	255 (59.3)	87 (20.2)	
		Not at all	122 (28.4)	343 (79.8)	
10	Do you feel depressed	Very much	33 (7.7)	0	<0.001**
		A lot	260 (60.5)	0	
		A little	137 (31.9)	184 (42.8)	
		Not at all	0	246 (57.2)	
11	Do you keep thinking about this disease	Very much	188 (43.7)	55 (12.8)	<0.001**
		A lot	211 (49.1)	261 (60.7)	
		A little	31 (7.2)	87 (20.2)	
		Not at all	0	27 (6.3)	
12	Have you stopped/reduced going to parties/get-togethers	Very much	66 (15.3)	0	<0.001**
		A lot	235 (54.7)	80 (18.6)	
		A little	106 (24.7)	262 (60.9)	
		Not at all	23 (5.3)	88 (20.5)	
13	Do your friends/relatives avoid you	Very much	0	0	0.057
		A lot	56 (13)	0	
		A little	119 (27.7)	98 (22.8)	
		Not at all	255 (59.3)	332 (77.2)	
14	Do you think about bringing your life to an end	Very much	0	0	0.004
		A lot	39 (9.1)	0	
		A little	186 (43.3)	135 (31.4)	
		Not at all	205 (47.7)	295 (68.6)	
15	Do you observe any kind of dietary restriction	Very much	0	0	<0.001**
		A lot	38 (8.8)	0	
		A little	255 (59.3)	119 (27.7)	
		Not at all	137 (31.9)	311 (72.3)	
16	Does the amount of money you have spent on the treatment bother	Very much	92 (21.4)	15 (3.5)	0.032
		A lot	230 (53.5)	182 (42.3)	
		A little	108 (25.1)	233 (54.2)	
		Not at all	0	0	
17	Do you believe that this is the worst disease anyone can have	Very much	0	0	<0.001**
		A lot	33 (7.7)	0	
		A little	196 (45.6)	139 (32.3)	
		Not at all	201 (46.7)	291 (67.7)	
18	Do you get embarrassed when meeting people	Very much	33 (7.7)	0	<0.001**
		A lot	255 (59.3)	81 (18.8)	
		A little	142 (33)	312 (72.6)	
		Not at all	0	37 (8.6)	
19	How worried will you be if you develop new lesions	Very much	89 (20.7)	40 (9.3)	<0.001**
A lot		305 (70.9)	290 (67.4)		
A little		36 (8.4)	100 (23.3)		
Not at all		0	0		
20	Do your in-laws worry about your white patches	Very much	186 (43.3)	0	<0.001**
		A lot	189 (44)	213 (49.5)	
		A little	55 (12.8)	204 (47.4)	
		Not at all	0	13 (3)	

21	Do your colleagues treat you differently because of the disease	Very much	101 (23.5)	0	<0.001**
		A lot	89 (20.7)	68 (15.8)	
		A little	213 (49.5)	317 (73.7)	
		Not at all	27 (6.3)	45 (10.5)	
22	Do you classmates treat you differently because of the disease	Very much	0	0	<0.001**
		A lot	53 (12.3)	0	
		A little	132 (30.7)	172 (40)	
		Not at all	245 (57)	258 (60)	

All values are expressed as the frequency with percentages (in parentheses); The statistical test used: Chi-square test; level of significance: *p<0.05 is considered statistically significant; **p≤0.001 is considered highly significant association.

Table 3: Comparison of Toronto Alexithymia Scale-20 (TAS) score pre and post Vitiligo treatment of the patients.

Sr. No	Questions	Response frequencies n (%)			p-Value
		Response	Pre	Post	
1	I am often confused about what emotion I am feeling.	Strongly Disagree	96 (22.3)	209 (48.6)	<0.001**
		Disagree	179 (41.6)	194 (45.1)	
		Neither Agree nor Disagree	126 (29.3)	27 (6.3)	
		Agree	29 (6.7)	0	
		Strongly Agree	0	0	
2	It is difficult for me to find the right words for my feelings.	Strongly Disagree	0	0	<0.001**
		Disagree	0	107 (24.9)	
		Neither Agree nor Disagree	69 (16)	276 (64.2)	
		Agree	255 (59.3)	47 (10.9)	
		Strongly Agree	106 (24.7)	0	
3	I have physical sensations that even doctors don't understand.	Strongly Disagree	0	0	<0.001**
		Disagree	0	0	
		Neither Agree nor Disagree	161 (37.4)	310 (72.1)	
		Agree	214 (49.8)	107 (24.9)	
		Strongly Agree	55 (12.8)	13 (3)	
4	I am able to describe my feelings easily.	Strongly Disagree	0	0	<0.001**
		Disagree	0	0	
		Neither Agree nor Disagree	81 (18.8)	23 (5.3)	
		Agree	215 (50)	236 (54.9)	
		Strongly Agree	134 (31.2)	171 (39.8)	
5	I prefer to analyze problems rather than just describe them.	Strongly Disagree	0	0	<0.001**
		Disagree	23 (5.3)	0	
		Neither Agree nor Disagree	148 (34.4)	81 (18.8)	
		Agree	228 (53)	209 (48.6)	
		Strongly Agree	31 (7.2)	140 (32.6)	
6	When I am upset, I don't know if I am sad, frightened, or angry.	Strongly Disagree	0	0	<0.001**
		Disagree	23 (5.3)	74 (17.2)	
		Neither Agree nor Disagree	126 (29.3)	236 (54.9)	
		Agree	242 (56.3)	120 (27.9)	
		Strongly Agree	39 (9.1)	0	
7	I am often puzzled by sensations in my body.	Strongly Disagree	0	0	<0.001**
		Disagree	0	0	
		Neither Agree nor Disagree	122 (28.4)	117 (27.2)	
		Agree	196 (45.6)	210 (48.8)	
		Strongly Agree	112 (26)	103 (24)	

8	I prefer to just let things happen rather than to understand why they turned out that way.	Strongly Disagree	0	0	<0.001**
		Disagree	15 (3.5)	110 (25.6)	
		Neither Agree nor Disagree	233 (54.2)	199 (46.3)	
		Agree	165 (38.4)	121 (28.1)	
		Strongly Agree	17 (4)	0	
9	I have feelings that I can't quite identify.	Strongly Disagree	0	0	<0.001**
		Disagree	0	0	
		Neither Agree nor Disagree	0	43 (10)	
		Agree	207 (48.1)	289 (67.2)	
		Strongly Agree	223 (51.9)	98 (22.8)	
10	Being in touch with emotions is essential.	Strongly Disagree	0	0	0.005
		Disagree	0	0	
		Neither Agree nor Disagree	0	28 (6.5)	
		Agree	193 (44.9)	284 (66)	
		Strongly Agree	237 (55.1)	118 (27.4)	
11	I find it hard to describe how I feel about people.	Strongly Disagree	0	15 (3.5)	<0.001**
		Disagree	15 (3.5)	0	
		Neither Agree nor Disagree	92 (21.4)	214 (49.8)	
		Agree	196 (45.6)	178 (41.4)	
		Strongly Agree	127 (29.5)	23 (5.3)	
12	People tell me to describe my feelings more.	Strongly Disagree	0	15 (3.5)	<0.001**
		Disagree	0	58 (13.5)	
		Neither Agree nor Disagree	51 (11.9)	203 (47.2)	
		Agree	253 (58.8)	136 (31.6)	
		Strongly Agree	126 (29.3)	18 (4.20)	
13	I don't know what's going on inside me.	Strongly Disagree	0	0	<0.001**
		Disagree	0	14 (3.3)	
		Neither Agree nor Disagree	52 (12.1)	204 (47.4)	
		Agree	215 (50)	188 (43.7)	
		Strongly Agree	163 (37.9)	24 (5.6)	
14	I often don't know why I am angry.	Strongly Disagree	0	0	<0.001**
		Disagree	0	0	
		Neither Agree nor Disagree	51 (11.9)	223 (51.9)	
		Agree	253 (58.8)	189 (44)	
		Strongly Agree	126 (29.3)	18 (4.2)	
15	I prefer talking to people about their daily activities rather than their feelings.	Strongly Disagree	0	32 (7.4)	<0.001**
		Disagree	0	357 (83)	
		Neither Agree nor Disagree	134 (31.2)	41 (9.5)	
		Agree	281 (65.3)	0	
		Strongly Agree	15 (3.5)	0	
16	I prefer to watch "light" entertainment shows rather than psychological dramas.	Strongly Disagree	0	0	0.62
		Disagree	0	124 (28.8)	
		Neither Agree nor Disagree	162 (37.7)	201 (46.7)	
		Agree	228 (53)	105 (24.4)	
		Strongly Agree	40 (9.3)	0	

17	It is difficult for me to reveal my innermost feelings, even to close friends.	Strongly Disagree	0	0	<0.001**
		Disagree	0	0	
		Neither Agree nor Disagree	0	178 (4.4)	
		Agree	201 (46.7)	252(58.6)	
		Strongly Agree	229 (53.3)	0	
18	I can feel close to someone, even in moments of silence.	Strongly Disagree	47 (10.9)	85 (19.8)	<0.001**
		Disagree	211 (49.1)	252 (58.6)	
		Neither Agree nor Disagree	154 (35.8)	93 (21.6)	
		Agree	18 (4.2)	0	
		Strongly Agree	0	0	
19	I find examination of my feelings useful in solving personal problems.	Strongly Disagree	0	0	<0.001**
		Disagree	0	0	
		Neither Agree nor Disagree	162 (37.7)	115 (26.7)	
		Agree	228 (53)	254 (59.1)	
		Strongly Agree	40 (9.3)	61 (14.2)	
20	I look for hidden meanings in movies or plays.	Strongly Disagree	0	149 (34.7)	<0.001**
		Disagree	197 (45.8)	248 (57.7)	
		Neither Agree nor Disagree	177 (41.2)	33 (7.7)	
		Agree	56 (13)	0	
		Strongly Agree	0	0	

All values are expressed as the frequency with percentages (in parentheses); The statistical test used: Chi-square test; level of significance: *p<0.05 is considered statistically significant; **p<0.001 is considered highly significant association.

Table 5 depicts the key components observed through each assessment scale. DLQI scale reported extremely large effect on QoL in the included patient’s pre-treatment. Effect was slightly reduced (very large effect) post-treatment. Similar trajectory was reported by the VIS-22 scale: Large impact (n=349; 81.16%) before treatment, was converted to small impact (n=388; 90.23%) after treatment, and VitiQoL scale: moderate effect (n=229; 53.25%) converted to mild effect (n=242; 56.28%).

Table 6 shows the relation between the vitiligo assessment scales used in this study, with their respective age, gender, geographical area and types of vitiligo for a holistic score point evident to the proposed hypothesis for the impact on QoL.

Discussion

Vitiligo is increasingly acknowledged for its profound and multifaceted impact on the psychosocial dimensions and quotidian functioning of government employees, significantly undermining their Quality of Life (QoL). While the severity of the disease constitutes a salient factor, it is not the sole determinant; rather, a confluence of sociocultural stigma, psychological distress, and occupational stressors exacerbates the emotional burden experienced by individuals afflicted with vitiligo, potentially precipitating a cascade of anxiety, depression, and other psychosocial sequelae.

In this unprecedented survey-based investigation, we employed a comprehensive array of QoL assessment instruments, including the Dermatology Life Quality Index (DLQI), Vitiligo Impact Scale (VIS), Toronto Alexithymia Scale (TAS), and VitiQoL. The findings unequivocally elucidate that vitiligo significantly disrupts patients’ daily activities, particularly within the governmental milieu. This necessitates a nuanced understanding of how vitiligo adversely impacts QoL and underscores the imperative for targeted management strategies that optimize mental health and psychological

stability in affected individuals.

The pathogenesis of vitiligo is intricate and multifactorial, characterized by an interplay of immunological mechanisms such as interferon-gamma signaling, CXCL10 chemokine pathways, JAK-STAT cascades, CD8+ T lymphocyte activation, and the involvement of heat shock protein 70 [19]. Current therapeutic modalities encompass systemic immunosuppressants, topical corticosteroids, narrow-band ultraviolet B (NB-UVB) phototherapy, and various surgical interventions; however, a definitive cure remains an elusive objective [20].

The psychosocial burden associated with vitiligo is exacerbated by its visibility and the resultant societal perceptions. Patients frequently encounter stigmatization and discrimination, leading to substantial emotional distress and social withdrawal. The ramifications extend beyond mere cosmetic concerns; they infiltrate interpersonal relationships, occupational performance, and overall mental health.

In light of these findings, it is imperative to prioritize psychosocial interventions in conjunction with conventional dermatological treatments. A multidisciplinary approach that integrates psychological support services may enhance coping mechanisms and improve overall QoL for individuals with vitiligo. Future research endeavours should focus on elucidating the specific psychosocial mechanisms at play in this population to inform more effective therapeutic strategies that address both the physical manifestations of vitiligo and its profound psychological implications. Longitudinal studies are warranted to assess the efficacy of combined therapeutic modalities over time and their impact on clinical outcomes as well as patient-reported QoL metrics. Such insights will be crucial for developing comprehensive care models that holistically address the complexities inherent in managing vitiligo within diverse patient populations.

Table 4: Comparison of Vitiligo-specific health-related quality of life (VitiQoL) score pre and post Vitiligo treatment of the patients.

Sr. no	Questions	Response frequencies n (%)			p-Value
		Response	Pre	Post	
1	Have you been bothered by the appearance of your skin condition?	Rarely	0	0	0.531
		Occasionally	0	0	
		Sometimes	0	69 (9.8)	
		Frequently	42 (9.8)	390 (55.2)	
		Usually	237 (55.1)	248 (35.1)	
		All the time	151 (35.1)	0	
2	Have you felt frustrated about your skin condition?	Rarely	0	0	0.255
		Occasionally	0	0	
		Sometimes	0	86 (12.2)	
		Frequently	53 (12.3)	363 (51.3)	
		Usually	220 (51.2)	258 (36.5)	
		All the time	157 (36.5)	0	
3	Has your skin condition made it hard to show affection?	Rarely	0	28 (4)	<0.001**
		Occasionally	187 (43.5)	481 (68)	
		Sometimes	135 (31.4)	135 (19.1)	
		Frequently	93 (21.6)	38 (5.4)	
		Usually	15 (3.5)	25 (3.5)	
		All the time	0	0	
4	Has your skin condition made it hard to show affection?	Rarely	0	0	0.646
		Occasionally	0	0	
		Sometimes	0	248 (35.1)	
		Frequently	172 (40)	217 (30.7)	
		Usually	183 (42.6)	218 (30.8)	
		All the time	75 (17.4)	24 (3.4)	
5	When you were talking to someone, have you worried about what they may be thinking of you?	Rarely	0	0	<0.001**
		Occasionally	0	21 (3)	
		Sometimes	29 (6.7)	44 (6.2)	
		Frequently	108 (25.1)	339 (47.9)	
		Usually	199 (46.3)	303 (42.9)	
		All the time	94 (21.9)	0	
6	Have you been afraid that people will find fault with you?	Rarely	0	0	0.041*
		Occasionally	0	0	
		Sometimes	24 (5.6)	135 (19.1)	
		Frequently	162 (37.7)	334 (47.2)	
		Usually	192 (44.7)	238 (33.7)	
		All the time	52 (12.1)	0	
7	Have you felt embarrassed or self-conscious because of your skin?	Rarely	0	0	<0.001**
		Occasionally	0	0	
		Sometimes	0	136 (19.2)	
		Frequently	96 (22.3)	251 (35.5)	
		Usually	214 (49.8)	320 (45.3)	
		All the time	120 (27.9)	0	

8	Has your skin condition influenced the clothes you wear?	Rarely	0	0	0.312
		Occasionally	0	0	
		Sometimes	0	0	
		Frequently	50 (11.6)	309 (43.7)	
		Usually	208 (48.4)	398 (56.3)	
		All the time	172 (40)	0	
9	Has your skin condition affected your social or leisure activities?	Rarely	0	0	<0.001**
		Occasionally	0	21 (3)	
		Sometimes	14 (3.3)	20 (2.8)	
		Frequently	59 (13.7)	383 (54.2)	
		Usually	217 (50.5)	283 (40)	
		All the time	140 (32.6)	0	
10	Has your skin condition affected your emotional well-being?	Rarely	0	0	<0.001**
		Occasionally	0	153 (21.6)	
		Sometimes	0	305 (43.1)	
		Frequently	122 (28.4)	173 (24.5)	
		Usually	209 (48.6)	76 (10.7)	
		All the time	99 (23)	0	
11	Has your skin condition affected your overall physical health?	Rarely	0	150 (21.2)	<0.001**
		Occasionally	96 (22.3)	434 (61.4)	
		Sometimes	255 (59.3)	123 (17.4)	
		Frequently	79 (18.4)	0	
		Usually	0	0	
		All the time	0	0	
12	Has your skin condition affected your grooming practices (i.e. hairstyle, use of cosmetics)?	Rarely	0	0	0.663
		Occasionally	0	105 (14.9)	
		Sometimes	0	228 (32.2)	
		Frequently	134 (31.2)	233 (33)	
		Usually	214 (49.8)	141 (19.9)	
		All the time	82 (19.1)	0	
13	Has your skin condition affected your sun protection efforts during recreation (i.e. limiting exposure time during peak sun hours, seeking shade, wearing hat, long sleeves or pants)?	Rarely	0	0	<0.001**
		Occasionally	0	0	
		Sometimes	0	0	
		Frequently	0	281 (39.7)	
		Usually	180 (41.9)	330 (46.7)	
		All the time	250 (58.1)	96 (13.6)	
14	Has your skin condition affected your chances for making new friends?	Rarely	0	0	0.043*
		Occasionally	0	0	
		Sometimes	0	371 (52.5)	
		Frequently	235 (54.7)	336 (47.5)	
		Usually	195 (45.3)	0	
		All the time	0	0	
15	Have you worried about progression or spread of disease to new areas of the body?	Rarely	0	0	0.318
		Occasionally	0	0	
		Sometimes	0	137 (19.4)	
		Frequently	0	369 (52.2)	
		Usually	300 (69.8)	201 (28.4)	
		All the time	130 (30.2)	0	

16	Please check how severe you currently feel your skin condition is: Severity of skin condition:	Rarely	0	0	0.039*
		Occasionally	0	202 (28.6)	
		Sometimes	0	367 (51.9)	
		Frequently	243 (56.5)	138 (19.5)	
		Usually	187 (43.5)	0	
		All the time	0	0	

All values are expressed as the frequency with percentages (in parentheses); The statistical test used: Chi-square test; level of significance: *p<0.05 is considered statistically significant; **p≤0.001 is considered highly significant association.

Table 5: Comparison of different Vitiligo scales categories pre and post treatment of the patients.

Vitiligo assessment scales	Pre n (%)	Post n (%)	p-Value
DLQI			
No effect	0	0	0.046*
Small effect	0	33 (7.67)	
Moderate effect	30 (6.98)	97 (22.56)	
Very large effect	86 (20)	277 (64.42)	
Extremely large effect	314 (73.02)	23 (5.35)	
VIS-22			
Clinically significant	18 (4.19)	25 (5.81)	0.03*
Small Impact	63 (14.65)	388 (90.23)	
Large Impact	349 (81.16)	17 (3.95)	
TAS-20			
No alexithymia	34 (7.91)	160 (37.21)	<0.001**
Possible alexithymia	161 (37.44)	240 (55.81)	
Alexithymia present	235 (54.65)	30 (6.98)	
VitiQoL			
No effect	10 (2.32)	114 (26.51)	<0.001**
Mild effect	53 (12.32)	242 (56.28)	
Moderate effect	229 (53.25)	66 (15.35)	
Severe effect	138 (32.09)	8 (1.86)	

The statistical analysis used: multiple linear regression; CI: Confidence Interval; SE: Standard Error; DLQI: Dermatology Life Quality Index; VIS-22: Vitiligo Impact Scale-22; TAS: Toronto Alexithymia Scale-20; VitiQoL: Vitiligo-specific health-related quality of life; level of significance: *p≤ 0.05 is considered statistically significant.

Quality of Life

Amer et al. [21] documented an average Dermatology Quality of Life Index (DLQI) score of 8.4 among vitiligo patients; in stark contrast, our investigation yielded a markedly elevated mean DLQI score of 20.13, which also surpasses the findings reported by Wang et al. [22]. Notably, factors such as embarrassment and diminished self-efficacy in social contexts emerged as predominant determinants within our cohort, corroborating the observations made by Radtke et al. [23] (Figure. 1). This aligns with an optimistic patient outlook regarding overall QoL post-treatment, resonating with results articulated by Picardo et al. [24]. Our findings suggest that individuals from Asian nations, including India and China, exhibit higher DLQI scores relative to their Caucasian counterparts, likely attributable to sociocultural variances and phenotypic disparities in skin pigmentation. This outcome was similar to outcomes reported by Amer et al. [21].

Our analysis further elucidated that patient with active vitiligo-characterized by newly developed lesions-exhibited significantly elevated DLQI scores compared to those with stable disease, consistent with Picardo et al.'s [24] findings that underscore the detrimental impact of active vitiligo on QoL. A substantial proportion of participants reported sexual dysfunction attributable to skin irregularities post-treatment (<0.001), corroborating Liang et al.'s [25] assertion that individuals with vitiligo are at an augmented risk for sexual dysfunction, particularly among females. The primary contributors to sexual dysfunction identified in our study encompassed reduced lubrication, diminished libido, and decreased satisfaction.

A pronounced transformation in daily experiences was observed; government employees afflicted with vitiligo reported feeling increasingly encumbered and disorganized pre-treatment but transitioned to a more structured and less stressful routine post-treatment (<0.001), aligning with findings from Sanchez et al. [26]. Interestingly, married participants exhibited a more pronounced adverse impact from treatment-related lifestyle changes compared to their unmarried counterparts.

Disease-specific questionnaires assessing the QoL of vitiligo patients demonstrate superior analytical potential compared to generic instruments, facilitating enhanced predictability, responsiveness, adaptability, and acceptability in discerning varying levels of distress among participants [27]. The Vitiligo Impact Scale (VIS-22) was employed to quantify the QoL of vitiligo patients; our average VIS-22 score was 64.54 (Figure 1), surpassing scores reported in other studies [28]. Notably, 68.2% of participants expressed feelings of depression upon diagnosis but reported a cessation of depressive symptoms following treatment completion (<0.001). The VIS-22 correlated with DLQI regarding social interactions; 54.7% of participants felt embarrassed attending social gatherings due to skin complications (<0.001). Both scales demonstrated significant improvements post-treatment (p=0.024), consistent with Awal et al.'s [28] findings regarding the pervasive social pressures experienced by participants and their inclination to camouflage their appearance for societal acceptance.

The Toronto Alexithymia Scale (TAS-20) was utilized to assess the prevalence of alexithymia; [29] our study yielded an average TAS-20 score of 60.44, comparable to scores reported by Oglodek et al. [30]. Alexithymia, a psychological construct characterized by difficulty in identifying and articulating emotions, [31] was evident as 84% of participants (p<0.001) acknowledged challenges in expressing their feelings. This was further substantiated by responses to the statement "I often don't know why I am angry," with 88.1% agreeing (p<0.001). The overall prevalence of alexithymia ranges from 10% to 13%; however, some studies indicate comparatively elevated rates among vitiligo patients [32].

A noteworthy correlation was observed between DLQI and TAS-20 outcomes; all participants agreed or strongly agreed with the statement “It is difficult for me to reveal my innermost feelings,” reflecting the social implications highlighted by DLQI ($p < 0.001$). Alexithymia was present in 54.7% of participants—lower than Picardi et al.’s³³ report of 68%—yet aligned with findings indicating poor social support and insecure attachment among individuals afflicted with vitiligo.

Given the high prevalence and escalating burden associated with vitiligo, an unbiased evaluation of disease-specific QoL is imperative [2,34]. The governmental sector poses a heightened risk for depression and anxiety due to occupational stressors inherent in this environment. The VitiQoL questionnaire indicated an average score of 45.44 (pre- and post-treatment), surpassing Hedayat et al.’s [35] findings and demonstrating significant pre-treatment impact ($p = 0.03$), with over 81.2% reporting substantial effects on emotional well-being ($p < 0.001$). Participants predominantly reported frequent (40%) or usual impacts (42.6%) rather than constant effects (17.4%).

Our findings align with existing literature utilizing VitiQoL as an assessment tool; Hedayat et al. [35] noted that younger individuals exhibit better QoL compared to older cohorts due to increased emphasis on cosmesis among younger populations. Interestingly, our study found no direct correlation between QoL outcomes and vitiligo type; significant impacts were observed in social activities and clothing choices—findings corroborated by Catucci et al. [36] who similarly reported substantial effects on social engagement relative to friendships or academic pursuits.

Limitations

The deployment of multiple scales for the assessment of quality of life (QoL) among vitiligo patients introduces substantial methodological intricacies. While the diversification of assessment instruments aims to augment the QoL analysis and substantiate the proposed hypothesis, it concurrently engenders significant variability in result reporting. Each scale evaluates vitiligo patients through distinct paradigms, potentially precipitating information bias and obfuscating the clarity of the findings.

A secondary limitation pertains to the heterogeneity in scoring methodologies; the utilization of disparate scales for QoL assessment may engender research bias. A cogent conclusion necessitates a rigorous analysis predicated on uniform scoring metrics; however, the inherent variability in this approach may yield divergent interpretations of QoL outcomes among vitiligo patients.

Moreover, the veracity of patient responses merits critical examination. Given that participants were apprised of their involvement in a study focused on QoL, there exists a substantial risk of response bias. Additionally, the multicentric design of this study, encompassing individuals from a plethora of cultural and socioeconomic backgrounds across India, may introduce implicit biases that further compromise the authenticity of the reported data. These factors collectively underscore the imperative for meticulous consideration of bias in interpreting the findings and highlight the necessity for standardized assessment protocols in future research endeavors to enhance methodological rigor and reliability.

Conclusion

This investigation elucidates the significant psychosocial ramifications of vitiligo among government employees, highlighting

a salient correlation between Quality of Life (QoL) and psychological determinants. Active disease stages, particularly characterized by conspicuous lesions on the upper extremities, exert a deleterious impact on QoL, especially in individuals with darker skin phenotypes. The concomitant psychological burden substantially undermines mental health, self-esteem, and occupational efficacy. Addressing these multifaceted challenges necessitates the implementation of supportive workplace policies and the augmentation of mental health resources to optimize the well-being of affected individuals. While this study delineates the intricate interplay between psychological disorders and vitiligo within the governmental context, it is imperative to acknowledge inherent limitations. Future research should prioritize comprehensive medical consultations, robust evidence-based interventions to mitigate disease progression, and systematic psychological screening protocols to effectively address the complex needs of this population. Such initiatives are critical for advancing our understanding of vitiligo’s psychosocial impact and enhancing therapeutic outcomes through an integrative patient care paradigm.

Appendix

What could be the potential risk factors identified in patients with vitiligo?

Tables [1-4] shows the responses of the included participants to a structure questionnaire framework identifying factors potentially associated with the QoL of vitiligo patients using the scales DLQI, VIS-22, TAS-20 and VitiQoL.

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