International Clinical and Medical Case Reports Journal
Review Article (ISSN: 2832-5788)

Vitiligo and Its Impacts Across Ages

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Citation: *Therese Anne Limbana, Clarence Sams, Grace Ansah, Amandeep Kaur, Nicholas Gardyn, G. Vitiligo and Its Impacts Across Ages. Int ClincMed Case Rep Jour. 2024;3(5):1-11.*

Received Date: 06 May, 2024**; Accepted Date:** 08 May, 2024**; Published Date:** 10 May, 2024

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ABSTRACT

This comprehensive literature review aimed to understand the influence of age on the presentation, comorbidities, psychological impact, and treatment response in patients with vitiligo. The review highlighted that vitiligo tends to manifest later in males than in females, with unique characteristics associated with early and late-onset types. We observed a high psychosocial burden, particularly in early-onset vitiligo, associated with decreased quality of life, social withdrawal, and increased mental health issues. Our findings confirmed the frequent co-occurrence of vitiligo with autoimmune and inflammatory disorders, particularly thyroid diseases and alopecia areata. In examining quality of life and mental health, we noted a significant impact of vitiligo across all age groups, influenced by factors such as lesion visibility and location, gender, and socioeconomic status. We further highlighted an elevated risk of depression and anxiety across age groups, particularly in children and adolescents due to peer stigmatization and bullying, while adults experienced higher levels of social anxiety. Regarding treatment options, our review indicated a positive clinical response across a variety of interventions, with the duration of disease seemingly influencing the success of treatment. The location of vitiligo lesions significantly affected repigmentation timing and extent, and the influence of age on treatment outcomes, while implied, requires further exploration. Overall, this review underscores the importance of a holistic treatment approach that encompasses not only physical symptoms but also the mental health needs of vitiligo patients that are age appropriate.

Keywords: Vitiligo; Age of onset; Quality of life; Comorbidities; Treatment efficacy

INTRODUCTION AND BACKGROUND

Vitiligo is a dermatological disorder that manifests uniquely and unpredictably. As the most prevalent pigmentary disorder, it affects approximately 1 in every 100 individuals worldwide, regardless of ethnic or demographic characteristics.[1] While the hallmark of this disease is the presentation of sharply demarcated, milky white patches on the skin, the social and psychological ramifications are considerable. Despite the non-lethal nature of vitiligo,

its conspicuous symptoms can invite unsolicited attention, prejudice, and psychological distress, critically impacting the quality of life of those affected.[2]

The disorder commonly makes its first appearance in childhood or early adulthood. However, it can arise at any age. Despite this, comprehensive research elucidating the unique experiences of different age groups living with vitiligo remains inadequate. Therefore, this study has been designed to explore the question: *How does vitiligo impact different age groups uniquely?* Such insights are expected to contribute significantly to our understanding of the lived experiences of vitiligo patients, promoting age-specific care and management.

The psychological repercussions of vitiligo extend well beyond the surface of the skin. The disease has been linked to diminished self-esteem, shame and embarrassment, and more severe mental health issues such as anxiety and depression.[2] Yet, the intensity of these effects varies greatly depending on the individual's age at onset and their current age. Preliminary studies suggest that vitiligo's onset during childhood may have a distinct psychological fallout compared to onset in adulthood.[3] Children with vitiligo, for instance, are more vulnerable to bullying, leading to increased social withdrawal and anxiety.[4] Adults, conversely, often grapple with considerable challenges in their social and professional lives, facing distress due to perceived changes in their physical appearance.[5]

Another key factor influencing the psychological impact of vitiligo is the location and extent of vitiligo lesions. Facial lesions, in particular, cause significant distress due to their conspicuous nature and difficulty concealing, impacting social interactions.[5] However, how these factors affect individuals could vary according to age, adding another layer of complexity to our understanding of the disease. Despite these insights, there is a conspicuous lack of comprehensive studies exploring the varied impact of vitiligo across different age groups. Consequently, there is an urgent need to address this gap in the literature. By understanding the unique challenges faced by individuals of different ages living with vitiligo, we can pave the way for the creation of age-specific interventions designed to enhance the quality of life of these patients.

Vitiligo, despite its outward simplicity, exerts a broad and deep impact on those affected by it. While substantial progress has been made in understanding vitiligo's etiology and pathology, we have yet to fully comprehend how this disease uniquely affects different age groups. This research aims to fill that gap, offering a more comprehensive and nuanced view of the experiences of vitiligo patients across the age spectrum. The knowledge gleaned from this study will be instrumental in developing more personalized, age-sensitive strategies to better manage vitiligo, ultimately improving the quality of life for all patients affected by this disorder.

METHODOLOGY

This research study utilized a comprehensive literature review as its primary research method. The review was conducted on PubMed Central, a widely recognized and respected database of biomedical and life sciences literature. The search was carried out using the following search terms and Boolean phrases: (vitiligo OR leukoderma) AND (effects OR influence OR outcome OR impact) AND (children OR adolescent OR adult OR pediatric OR teenage OR young adult). This search aimed to find scholarly articles and studies investigating the effects, influence, outcomes, or impact of vitiligo or leukoderma on different age groups, including children, adolescents, adults, and young adults.

The inclusion criteria for this literature review were studies written in English, availability of abstracts and full text, and clear categorization of participants by age group. Studies that did not meet these criteria were excluded from the review. The exclusion criteria were set to ensure the quality and relevance of the selected studies. Studies were excluded if they were case studies, if they did not provide clear definitions of the age groups involved if they combined age groups, or if they considered other conditions in conjunction with vitiligo. After the screening process, the selected studies were critically appraised and synthesized. Data extraction included information on study characteristics, participant characteristics, and key findings related to the impact of vitiligo on the specified age groups.

RESULTS

The literature search yielded 451 studies stemming from the keywords used. Table 1 shows the total yield as keywords were introduced to the search.

Table 1

Keywords Used for the Literature Search	Number of Studies
Vitiligo OR leukoderma	3036
Effects OR influence OR outcome OR impact	1331
Children OR adolescents OR adults OR pediatric OR teenage OR young adults	451

After applying the inclusion and exclusion criteria to the search and reviewing each individually, 30 research studies remained for this literature review (Table 2).

Table 2

Study	Study Design	N	Age Group	Subject
Agrawal et al. (2021)	Cross-sectional	150	Adult	This study examined difficulties and social functioning in individuals with vitiligo by demographic factors.
Al-Shammari et al. (2021)	Cross-sectional	253	Adult	This study examined the quality of life of those with vitiligo.
Al-Shobaili (2014)	Clinical trial	48	Adult	This comprehensive summary of an article discusses the use of the 308-nm excimer laser in treating vitiligo.
Alharbi (2020)	Cross-sectional	308	Adolescent; adult	This study examined rates of depression in those with vitiligo by participant demographic characteristics.
Bhatia et al. (2021)	Prospective comparative	31	Adult	The study focuses on evaluating the effect of narrowband ultraviolet B (NB-UVB) phototherapy on disease progression in patients with progressive vitiligo.
Bhatnagar et al. (2007)	Prospective	50	Child; adult	This study examined the efficacy of phototherapy.
Bibeau et al. (2022)	Cross-sectional	35694	Adult	This study examined the prevalence and quality of life of adults with vitiligo by disease progression.

Cavalié et al. (2015)	Randomized controlled trial	35	Adult	The research study discussed evaluates the effectiveness of a maintenance treatment with tacrolimus 0.1%, a topical immunomodulator, applied twice-weekly to reduce the recurrence of previously repigmented vitiligo lesions.
Chahar et al. (2018)	Prospective comparative	54	Adult	This study compared treatment outcomes of NBUVB therapy.
Esmat et al. (2016).	Literature review	98	All	This study looked at current evidence pertaining to phototherapy for vitiligo treatment in all ages.
Ezzedine et al. (2021)	Systematic literature review	168	All	The study highlights that the psychosocial comorbidities of vitiligo are broader and more severe than previously assumed.
Gao et al. (2022)	Retrospective comparative	75	Adult	This study investigated two surgical interventions for refractory stable vitiligo: conventional suction blister epidermal graft (SBEG) and automated blister epidermal micrograft (ABEM).
Hamidizadeh et al. (2020)	Cross-sectional	100	Adult	This study looked at the prevalence of depression and anxiety among those with vitiligo.
Hedayat et al. (2016)	Cross-sectional	173	Adolescent; adult	This study investigated the emotional and mental well-being of individuals with vitiligo.
Janowska et al. (2016)	Clinical trial	5	Adult	This study examined the outcomes of vitiligo treatment through skin grafting.
Kong et al. (2017)	Retrospective review	3128	Adult	This study looked at the characteristics of late-onset vitiligo and treatment outcomes.
Lazzeri et al. (2016)	Retrospective review	500	Child; adult	This study compares and contrasts adult and childhood onset of vitiligo.
Londoño-Garcia et al. (2023)	Literature review	292	Child; adult	This study looks at common comorbidities found in those with vitiligo.
Marinho et al. (2013)	Retrospective observational	119	Child; adolescent	This study examines the clinical profile of children and adolescents with vitiligo.
Mysore et al. (2016)	Literature review	24	Adult	This study compared the outcomes of phototherapy on vitiligo by age.
Nicolaidou et al. (2007)	Prospective	70	Adult	This study looked at the long-term effects of phototherapy.
Patel et al. (2023)	Cross-sectional	9118	Child; adolescent	This study examined the prevalence of vitiligo in children and adolescents in the U.S., including both diagnosed and undiagnosed cases and vitiligo subtypes.
Picardo et al. (2022)	Systematic literature review	130	All	This study looked at factors that significantly reduce the quality of life in patients with vitiligo.
Raghuwanshi et al. (2018)	Retrospective	134	All	This study compared treatment outcomes with demographic characteristics.

Sangma et al. (2015)	Cross-sectional	100	Adult	This study examined the quality of life and psychological morbidities in those with vitiligo by demographic characteristics.
Seccombe et al. (2021)	Clinical trial	100	Child; adolescent	This study examined the treatment outcomes of children with vitiligo.
Shi et al. (2020)	Clinical trail	26	Adult	This study examined subjective, objective, and experimental outcomes of vitiligo treatment.
Thompson et al. (2022)	Retrospective observational	7224	Adult	This study looked at pre-existing and the development of new mental health disorders in those with vitiligo.
Yang et al. (2022)	Cross-sectional	200	Adult	This study examined quality of life in those with vitiligo by symptoms, duration of illness, and % of body involved.
Yazici et al. (2017)	Retrospective review	26	Child	The aim of the study was to evaluate the efficacy and short-term safety of Narrowband UVB (Nb UVB) phototherapy in children diagnosed with vitiligo.

DISCUSSION

Understanding the nuances between vitiligo's early-onset (during childhood) and late-onset (during adulthood) forms can provide insights into better patient management strategies. Overall, vitiligo tends to manifest later in males than females, with most cases representing the generalized form.[6] There are unique elements for each onset type: characteristics such as phototype II, primary disease presentation on the upper limbs, and the presence of the Koebner phenomenon are more prevalent in early-onset vitiligo.[7] Conversely, phototype III, personal history of hypertension, and initial disease location on the head and neck are more common in late-onset, which also appears more susceptible to stress as an initiating factor.

Early-onset vitiligo, particularly, can significantly affect patients' quality of life, leading to social withdrawal, anxiety, depression, and body dysmorphic disorder.[8] Moreover, 60% of patients in one study disclosed a significant event such as parental separation, death of a parent, sexual abuse, or death of a pet, suggesting a potential relationship between psychological trauma and the disease course in children and adolescents.[6] Additionally, there is a high prevalence of undiagnosed vitiligo among children and adolescents in the U.S., with a disproportionally higher rate in Hispanic, Latino, or Spanish-origin children.[8]

Comorbidities

Vitiligo, characterized by skin depigmentation due to melanocyte loss, is not merely a cosmetic issue. This autoimmune condition often coexists with other autoimmune and inflammatory disorders, and its psychosocial burden can be considerable. The disease's impact varies by age and is further influenced by factors like skin phototype and lesion location. Approximately 25% of vitiligo patients experience other autoimmune and

inflammatory conditions.[9] The most common autoimmune comorbidities are thyroid disorders and alopecia areata.[10] Furthermore, adult vitiligo patients exhibit a higher prevalence of thyroid disease, autoimmune thyroid disease (ATD), and thyroid nodules. Interestingly, though, thyroid disease usually develops before vitiligo.[7] The combined impact of vitiligo and comorbidities is substantial and can even be comparable to other chronic dermatological conditions or severe non-dermatological diseases like cancer. Emotional distress is present in about 70% of segmental vitiligo (SV) patients and 62.5% of non-segmental vitiligo (NSV) patients.[9] Over 50% of vitiligo patients report experiencing psychosocial comorbidities, including severe depression, which could even elevate suicide risk.[9]

Chronic conditions, in addition to vitiligo, can significantly impact various aspects of life, including societal, economic, and productivity factors. Age of onset, gender, phototype, and lesion extension and distribution significantly contribute to the disease's impact on quality of life. Vitiligo with comorbidities can be particularly impactful in children and adolescents, leading to low self-esteem, avoidance of social activities, frequent school absences, and mental health issues.[9] In comparison, adults with vitiligo and comorbidities, especially those with darker skin, reported experiencing greater daily life burden.[9]

Quality of Life, Anxiety, and Depression

Vitiligo greatly impacts a patient's quality of life (QoL), presenting challenges beyond physical health. The psychosocial implications of vitiligo affect self-esteem, emotional well-being, and social interactions. These effects vary significantly with age, gender, geographical location, and cultural context. For instance, 98% of patients' family members report the significant emotional and social burdens of vitiligo.[11] Particularly, factors like gender and marital status also greatly influence QoL. For all age groups, vitiligo's adverse effects on mental health are primarily associated with visible lesions, particularly on the face, hands, and feet.[12] Patients with more advanced diseases, regardless of age, endure the most considerable QoL impacts.[13] Research suggests that vitiligo's burden may be underestimated due to presently used instruments to measure mental health in this population.[1]

On the contrary, being female, younger (especially adolescents), and having less visible or extensive lesions are protective factors against worsening mental health due to vitiligo.[14] Additional factors, such as employment status, socioeconomic standing, and psychosocial burdens, such as depression, further influence QoL. One study highlights a concerning statistic in that 59% of vitiligo patients have reported depression, with 8% expressing suicidal ideation.[15] Furthermore, adult vitiligo patients experienced more significant deterioration in their emotional well-being and overall QoL than their pediatric counterparts.[16]

Age is an influential factor affecting vitiligo QoL, with different age groups experiencing unique challenges. For instance, those aged 20 to 39 are particularly affected in the occupational sphere and overall QoL.[16] Younger patients, especially adolescents, have a poorer QoL where friends and classmates were concerned, potentially due to the psychosocial pressures associated with their developmental stage.[14] In children and adolescents with vitiligo, the impact on emotional and mental well-being can be considerable. The appearance of vitiligo lesions during this crucial developmental period often leads to heightened feelings of embarrassment, stigmatization, and bullying from peers.[8] These factors contribute to an increased risk of anxiety and depression in this age group. By contrast, adults experience a higher level of social anxiety due to their visible skin condition.[1] Additionally,

psychological symptoms are more prevalent among women, suggesting gender-related differences in emotional responses to vitiligo.[8]

The manifestation of vitiligo during childhood and adolescence often leads to significant clinical depression. One study quantified that depression among patients aged 14 years or less ranged from none (31.7%), mild (32.7%), moderate (23.8%), to severe (11.9%).[17] This age group, in particular, was found to be more prone to depression due to potential stigmatization and negative social consequences associated with the disease. Among young adults (15-30 years old), the prevalence of depression appears to decline compared to the younger age group.[17] This group showed a higher percentage of no depression (53.3%), with decreasing rates of mild (26.7%), moderate (14.7%), and severe depression (5.3%).

In adults aged over 30, the prevalence of no depression was slightly lower (49.1%), with rates of mild depression at 26.3%, moderate depression at 17.5%, and severe depression at 7.0%.[17] Other research has highlighted an increased risk of 25% for Recurrent Depressive Disorder (RDD) and 23% for anxiety disorder in vitiligo patients compared to controls over a two-year follow-up period.[18] Interestingly, the increased risk of new-onset RDD is greater among Black and minority ethnic individuals of all age groups.[18]

While fewer studies focus on the emotional impact of vitiligo on elderly populations, it is clear from the available literature that this demographic is not immune to the psychological effects of the condition. Older adults with vitiligo often report feelings of sadness, frustration, and fear related to the progressive nature of the disease and the potential for increased visibility of lesions.[13] Across all age groups, vitiligo has been consistently associated with increased emotional distress and poorer mental health. The visibility of the condition, combined with societal stigma, contributes to heightened anxiety, depression, and decreased self-esteem.[19,20] These psychological challenges underscore the need for a holistic treatment approach that addresses not only the physical symptoms but also the emotional and mental health needs of patients with vitiligo.

Treatments

Treatment options range from topical creams and phototherapy to surgical grafting. Many patients respond well to these treatments, with roughly 41% showing substantial improvement.[10] Tacrolimus 0.1%, a topical immunomodulator, has been evaluated for its effectiveness as a maintenance treatment for vitiligo. The twice-weekly application of this treatment has shown efficacy in maintaining pigmentation and preventing the depigmentation of previously repigmented vitiligo patches.[21] Notably, dual therapy with topical creams and phototherapy yields a superior clinical response than monotherapy, with 56.6% of patients achieving significant epidermal repigmentation compared to 30.6% in monotherapy. Despite the effectiveness of phototherapy, there is a significant rate of relapse post-treatment though.[22–24]

All patients undergoing surgical grafting show excellent results. Total lesion repigmentation is observed in 14% of early-onset cases, while 83% report satisfactory repigmentation. Although conventional suction blister epidermal graft (SBEG) demonstrates a higher repigmentation rate in patients, automated blister epidermal micrograft (ABEM) is a quicker procedure, suggesting it is more suitable for outpatient surgery or larger treatment areas.[25] ABEM also presented better outcomes at the donor site, with fewer reported side effects such as pain and scarring. Lastly, epidermal skin grafts applied to various body sites, including elbows, hands, neck, and shins,

completely heal within 14 days with minimal discomfort, resulting in repigmentation about eight weeks post-treatment.[26,27]

Research suggests that clinical response, by age, is uniform across the different clinical treatment modalities utilized and that age does not affect treatment outcomes.[6,28] The disease duration seems to influence the success of the treatment, with those with shorter disease duration showing greater repigmentation.[29] However, research focusing on the efficacy of NB-UVB phototherapy in children has shown varied results, with some children showing significant improvement while others showed no improvement.[28,30] Despite varied results, NB-UVB phototherapy seems to be a well-tolerated, effective, and safe treatment option in children, particularly those unresponsive to topical treatment and those with widespread lesions.[30] Nonetheless, age and the location of vitiligo lesions influence repigmentation timing and extent, with lesions on the face and neck repigmenting earlier than other areas.

While not all studies provided an age-specific analysis, a few report excellent outcomes in older adult patients.[26] Similarly, researchers found that age influenced the timing and extent of repigmentation.[27] These findings suggest the potential role of age in determining the outcome of surgical treatments for vitiligo. Different surgical methods may be more suitable for certain patient groups and situations.[25] However, the exact relationship between age and treatment success remains unclear, necessitating further studies to establish a more precise understanding.

CONCLUSION

This comprehensive literature review highlights the significant impact of vitiligo across diverse age groups, with notable implications for physical and mental health and the patient's quality of life. A rigorous search and analysis methodology synthesized a wide array of relevant studies, shedding light on the varying influences of age on vitiligo's effects. The study's major strength lies in its thorough, systematic approach to the literature review, facilitating a detailed analysis of the research landscape around vitiligo and its impacts. By focusing on a renowned database like PubMed Central and using clearly defined inclusion and exclusion criteria, we ensured the incorporation of high-quality, relevant studies into the review. The methodology encompassed a wide range of age groups and adopted a broad view of vitiligo's impacts, going beyond physical manifestations to consider psychological, emotional, and quality-of-life aspects.

Despite these strengths, the review has some limitations. The research was restricted to English language studies, which may have resulted in relevant non-English studies being excluded, thus potentially introducing a language bias. Furthermore, excluding case studies may have omitted potentially significant, individual perspectives on vitiligo's impact. Some studies included in the review did not provide age-specific analyses of their results despite listing segregated age groups. This could limit the precision of age-based conclusions drawn from this review.

Given the limitations and gaps identified in this literature review, several future research directions are recommended. Studies examining the impact of vitiligo across diverse cultural and geographic contexts, particularly non-English speaking populations, should be conducted to build a more comprehensive global understanding. Future studies should emphasize age-specific analysis to draw out the nuanced impacts of vitiligo across different stages of life. Furthermore, research focusing on personal narratives and case studies may provide valuable insights into the lived experiences of individuals with vitiligo.

Research should also be conducted on the effectiveness of treatment modalities across different age groups, considering variables such as disease duration, location, and extent of vitiligo lesions. Future studies should also explore the psychological support needed for different age groups, such as counseling or group therapy, to address the mental health impacts of vitiligo. In conclusion, this literature review contributes a valuable, in-depth examination of the effects of vitiligo across diverse age groups. The findings underscore the importance of comprehensive care and targeted interventions for individuals with vitiligo to improve their physical and mental well-being and their overall quality of life.

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