



Article

The treatment efficacy of vitiligo patients attending in a dermatology clinic: an impact of clinico-epidemiological profiles and co-morbidities

Md Mahabubur Rahaman¹, Anzirun Nahar Asma², Ayesha Siddiqua³, Sabrina Akter¹, Rahmat Ullah Siddique¹ and Morshad Alam^{1*}

¹Aurora Skin and Aesthetics, Panthapath, Dhaka-1205, Bangladesh

²Popular Medical College and Hospital, Dhanmondi, Dhaka-1205, Bangladesh

³Delta Medical College and Hospital, Mirpur, Dhaka-1216, Bangladesh

*Corresponding author: Morshad Alam, Aurora Skin and Aesthetics, Panthapath, Dhaka-1205, Bangladesh. E-mail: evan.morshad1@gmail.com

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Abstract: There is widespread misinformation, taboos, and a lack of scientific analysis about vitiligo. In Bangladesh, there is a scarcity of research on vitiligo, though advanced treatments are widely available. This study aimed to investigate the treatment efficacy of vitiligo in a selected dermatology clinic and analyze the factors that impact the efficacy level. This was an analytical cross-sectional study among vitiligo patients who attended a dermatology clinic for treatment and were followed up for at least six months. Patients were treated by experienced physicians through a holistic treatment approach. An interviewer-administered questionnaire was used to collect information after obtaining informed consent. The data was processed by Microsoft Excel 2013 and analyzed by SPSS 25.0. The mean age of the study participants was 25.14 ± 13.32 years, where 60% were female. Acrofacial (33%), focal (27%), and acral (14%) are the most common types of vitiligo, and the face (n=73) is the most common body part. We have seen excellent treatment efficacy as proven by 94% of patients' lesion sizes decreased and 96% gained repigmentation at six months' follow-up. Our study revealed there is a negative impact of the presence of systemic disease and co-morbidities on vitiligo. The efficacy of the treatment was significantly affected by advanced age, body surface area, hypertension, diabetes, and anemia ($P < 0.05$). Our analysis revealed a good treatment efficacy of holistic treatment for vitiligo in selected clinic. For more effective treatment, control of co-morbidities is essential. The findings of this study will help clinicians in their decision making during the treatment process of vitiligo.

Keywords: treatment efficacy; dermatology; epidemiology; clinicians; Bangladesh

1. Introduction

Melanocytes in the epidermis and hair follicles become inactive or die, leading to the acquired depigmentary disease known as vitiligo. It is a global skin condition and even seen in Bangladesh (Hazra *et al.*, 2014; Bergqvist and Ezzedine, 2020). Overall, 1-2% of the world's population is affected by this confined, acquired, hypomelanotic or de-melanotic skin condition, which is characterized by milky white patches of various sizes and forms. Though incidence and prevalence are unknown in Bangladesh, vitiligo incidence in India was reported to range from 0.22 to 2.5% (Barros *et al.*, 2014; Bergqvist and Ezzedine, 2020). Patients suffer from social stigma due to widespread stereotypes, misinformation, taboos, a lack of scientific analysis, and the

mistaken association of vitiligo with leprosy. This illness does not affect a person's ability to work or their life expectancy, but it results in cosmetic disfigurement that causes psychological suffering (Vora *et al.*, 2014; Bidaki *et al.*, 2018; Khuld, 2019).

The causes of vitiligo are still unclear, as are the risk factors and available therapies. There are three distinct clinical types of vitiligo; firstly, the generalized type, which covers a large portion of the body; secondly, the segmental type, which spreads along a nerve; and lastly, the localized type, which is difficult to categorize and may later turn into either the generalized type or the segmental type (Bergqvist and Ezzedine, 2020; Kim *et al.*, 2022). For each category, the effectiveness of the treatment varied (Mahapatra *et al.*, 2019). There has been substantial research done on Chinese and Brazilian people. These investigations identified thyroid issues and type 1 diabetes mellitus as vitiligo risk factors (Silva de Castro *et al.*, 2012; Sheth *et al.*, 2019).

The goals of vitiligo treatment are to slow down or stop the disease from progressing, act as a precursor to the regrowth of melanocytes, and restore the color of the skin. Creams, such as corticosteroids or calcineurin inhibitors, may be able to restore color to the white patches of skin. Phototherapy helps to restore color to the skin. There are several different forms of light therapy. Doctors may use light boxes to treat large areas of vitiligo and use laser treatments on more localized areas. As with other treatments, it is very important to limit exposure to sunlight during and after treatment (Chen *et al.*, 2021; Lei *et al.*, 2021; Bellei *et al.*, 2022).

For younger individuals with a brief illness and lesions on their face, neck, and hair, treatment would be advised. Over 22% of white hair density is linked to hyperpigmentation, although it has little to no effect on how well a treatment works. It is advised that offering vitiligo patients health care counseling may help lessen depressive symptoms and preserve their psychological health, improving their quality of life (Chan *et al.*, 2013; Huang *et al.*, 2020). To improve the treatment events for this disease and to find out long-term efficacy, it is crucial to identify the molecular and cellular alterations occurring in normally pigmented skin in vitiligo patients (Delmas and Larue, 2019).

The patient's demographic characteristics, clinical characteristics, systemic illness, and laboratory findings would be crucial for the treatment of vitiligo. Few studies have examined the treatment efficacy of vitiligo; however, studies conducted among the Bangladeshi population are extremely rare. This study aimed to investigate the efficacy of a holistic treatment approach against vitiligo and analyze the factors that impact the efficacy level. Therefore, we investigated the treatment responses of patients with vitiligo who visited our dermatology clinic. This will evaluate the effectiveness of our treatment module for vitiligo patients and determine the impact of clinico-epidemiological profiles and other co-morbidities on efficacy. The findings of this study would help clinicians choose treatment options as well as make decisions in complex situations.

2. Materials and Methods

2.1. Ethical approval

Ethical approval was obtained from the local ethical approval committee of Popular Medical College. Informed consent from all the patients who participated was obtained before the initiation of the study. Data files for statistical analysis were prepared to ensure the confidentiality of any information about the study participants and did not include any personal identification. Refusal to participate was respected at any point after enrollment in the study. Each of the steps of this study was completed following the Helsinki Declaration (1964).

2.2. Study design

This was an analytical retrospective study among vitiligo patients who got treatment at Aurora Skin and Aesthetics (AASA) were followed up for six months. An interviewer-administered questionnaire with demographic, clinico-epidemiological, treatment, and co-morbidity related variables was used to collect information. The demographic variables include age, sex, occupation, family history, etc. The clinical characteristics include the type of vitiligo, duration, progression, infected site, surface area, number of lesions, etc. The co-morbidities we had considered for analysis were hypertension, diabetes mellitus, thyroiditis, and anemia. The AASA follows a holistic approach for the treatment of vitiligo. The treatment process was run by the experienced doctors through topical, systemic, and phototherapy. In the treatment process, the patients followed up every two months intervals during the study period of six months.

2.3. Study population

The target population was all vitiligo patients who came to AASA for treatment and were available for follow-up after six months of treatment administration. Due to the limitations of manpower, resources, and time, we have collected and analyzed the data of 100 vitiligo patients. The selection of the study participants was done through a purposive sampling technique.

2.4. Data collection tools and technique

For the collection of data, all required tools were made readily available. The toll list includes, questionnaire, measuring tap, weight machine, blood pressure machine, etc. Laboratory investigations were also done on the recommendation of a physician. Anthropometric and blood pressure measurements, laboratory investigations for fasting blood sugar and lipid profiles, etc. were done by experienced technical personnel. Before data collection, the questionnaire was pre-tested among 10 vitiligo patients and necessary changes to the questionnaire were implemented by the researchers.

2.5. Data analysis

The collected data was processed by Microsoft Excel (2013) and analyzed using SPSS (Statistical Product and Service Solutions), version 25.0. Descriptive statistics such as mean, frequency, and percentage were used to describe the dependent and independent variables. Descriptive statistics were performed for all of the possible variables. Some socio-demographic variables, vitiligo status, and treatment approach were our independent variables and treatment efficacy was the dependent variable. The statistical analysis was also done to determine the factors those are associated with poor treatment efficacy. The test statistics used to analyze the data were Chi-square (χ^2) or Fisher exact tests to determine the association between dependent and independent variables. The level of significance was set at 5%, and a $P < 0.05$ considered statistically significant.

3. Results

3.1. Socio-demographic profile and disease status

The mean age of the study participants was 25.14 ± 13.32 , and 41% of them were young adults aged between 19 to 35 years. The majority of our patients (60%) were female, and only 16% had a family history of vitiligo. Acrofacial (33%) followed by focal (27%) are the most common types of vitiligo, with 89% being active cases, and the face (73%) was the most common site of vitiligo. The largest proportion (39%) of patients' 5-10% body surface area was covered by vitiligo, whereas in 8% of cases it was more than 30% and 70% of the patients carried more than three lesions. Other than vitiligo, 44% had at least one co-morbidity, with thyroiditis, anemia, and hypertension being the most common (Table 1).

Table 1. Socio-demographic profile and disease status of the vitiligo patients.

Variables	Category	Mean \pm SD	Percentage (%)
Age	< 19 years	25.14 ± 13.32	36
	19-35 years		41
	> 35 years		23
Sex	Female		60
	Male		40
Family History	No		84
	Yes		16
Type	Acral		14
	Acrofacial		33
	Focal		27
	Generalized		6
	Segmental		10
	Others		10
Disease activity	Active		89
	Inactive		7
	Stable		4
Progression	Rapid		6
	Slow		94
Vitiligo site	Face		73
	Trunk		19
	Upper extremities		65
	Lower extremities		67
	Lips		7
	Scalp		4
	Others		8

Table 1. Contd.

Variables	Category	Mean ± SD	Percentage (%)
Body surface area	<5%		24
	5-10%		39
	10-30%		29
	>30%		8
Number of lesions	Single lesions		10
	2 to 3 lesions		19
	>3 lesion		71
Hypertension	No		86
	Yes		14
Diabetes	No		91
	Yes		9
Thyroiditis	No		84
	Yes		16
Anemia	No		85
	Yes		15
Medical condition	No		56
	Yes		44

3.2. Treatment and follow-up status

Among the study participants, 77% received topical treatment, 76% received systemic treatment, and all of the participants received phototherapy (NB-UVB: 94%). After two months of treatment initiation, 30% of patients developed new lesions, lesion size decreased in 79% of cases, and re-pigmentation was seen in 90% of cases, indicating good treatment efficacy. Only 9% of patients had new lesions after 4 months of treatment; 90% of lesion sizes decreased, and re-pigmentation was seen in 92% of cases. After 6 months of follow-up, there was no new lesion among participants, the size of the lesion decreased in 94% of cases, and re-pigmentation was seen in 96% of cases, indicating good treatment efficacy (Table 2).

Table 2. Treatment and follow-up status of the vitiligo patients.

Variables	Category	Percentage (%)
Treatment taken	Topical treatment	77
	Systemic treatment	76
	Phototherapy by excimer system	6
	Phototherapy by NB-UVB	94
New lesion after two months	No	70
	Yes	30
Existing lesion size after two months	Decreased	79
	Increased	8
	Static	13
Repigmentation after two months	No	10
	Yes	90
New lesion after four months	No	91
	Yes	9
Existing lesion size after four months	Decreased	90
	Increased	6
	Static	4
Repigmentation after four months	No	8
	Yes	92
New lesion after six months	No	100
	Yes	0
Existing lesion size after six months	Decreased	94
	Increased	2
	Static	4
Repigmentation after six months	No	4
	Yes	96

3.3. Factors associated with vitiligo treatment efficacy

The age of the participants showed a statistically significant association with treatment efficacy at six months; however, for the other two follow-ups, the association was not statistically significant. According to our analysis, treatment efficacy decreased with the increasing age of patients. Treatment efficacy was also higher among female participants, who usually have a lower chance of sun exposure or other factors. The association was statistically significant at four months' follow-up. A higher efficacy was seen for three types of vitiligo: acral, acrofacial, and segmental vitiligo. The effect on low body surface area is clearly associated with the efficacy, which was alleged (Table 3).

Table 3. Factors associated with treatment efficacy and selected characteristics of patients.

Variables	6 months Efficacy, n (%)	P value	4 months Efficacy, n (%)	P value	2 months Efficacy, n (%)	P value
Age						
< 19 years	34 (94.4)	0.04*	34 (94.4)	0.26	32 (88.9)	0.18
19-35 years	40 (97.6)		35 (85.5)		30 (73.2)	
> 35 years	20 (87.0)		21 (91.3)		17 (73.9)	
Sex						
Female	57 (95.0)	0.18	56 (93.3)	0.04	48 (80.0)	0.06
Male	37 (92.5)		34 (85.0)		31 (77.5)	
Type of vitiligo						
Acral	14 (100.0)	0.06	14 (100.0)	0.05	10 (71.4)	0.24
Acrofacial	33 (100.0)		29 (87.9)		26 (78.8)	
Focal	24 (88.9)		25 (92.6)		25 (92.6)	
Generalized	5 (83.3)		6 (100.0)		4 (66.7)	
Segmental	10 (100.0)		10 (100.0)		8 (80.0)	
Others	6 (60.0)		6 (60.0)		6 (60.0)	
Body surface area						
<5%	23 (95.8)	0.34	24 (100.0)	0.01*	24 (100.0)	0.003*
5-10%	37 (94.9)		37 (94.9)		25 (64.1)	
10-30%	27 (93.1)		23 (79.9)		26 (89.7)	
>30%	7 (87.5)		6 (75.0)		4 (50.0)	
Hypertension						
No	82 (95.3)	0.09	78 (90.7)	0.79	72 (83.7)	0.01*
Yes	12 (85.7)		12 (85.7)		7 (50.0)	
Diabetes mellitus						
No	86 (94.5)	0.48	84 (92.3)	0.01*	75 (82.4)	0.01*
Yes	8 (88.9)		6 (66.7)		4 (44.4)	
Thyroiditis						
No	79 (94.0)	0.73	75 (89.3)	0.67	66 (78.6)	0.95
Yes	15 (93.8)		15 (93.8)		13 (81.3)	
Anemia						
No	81 (95.3)	0.002*	78 (91.8)	0.04*	68 (80.0)	0.70
Yes	13 (86.7)		12 (80.0)		11 (73.3)	
Other medical condition						
No	55 (98.2)	0.11	54 (96.4)	0.02*	48 (85.7)	0.12
Yes	39 (88.6)		36 (81.8)		31 (70.0)	

*Statistically significant

Our analysis identified a statistically significant association between co-morbidities and treatment efficacy, as a high percentage of lesion size decrease was seen for patients who were free of comorbidities. Three common co-morbidities—hypertension, DM, and anemia also separately showed a statistically significant impact on treatment efficacy during the follow-up period (Table 3).

4. Discussion

The general public thinks that vitiligo is that it is an untreatable disease due to the previous slow-response therapies, making it a socially stigmatizing and distressing disease (Kadry *et al.*, 2018). Thus, previously conducted studies recommended a holistic treatment model that can provide phototherapy options, access to

topical and systemic treatment, surgical modalities for stable cases, and psychological support (Doolan *et al.*, 2022). This study has assessed the treatment efficacy of the recommended holistic approach, excluding the surgical approach.

The young adult population and females are dominant in our study. This is because women and young people are more concerned about their looks. This is important for both who are concerned with physical and mental health as well as those determining self-worth (Henriques and Patnaik, 2021). Similar findings were observed by some other studies, where they said that increased cosmetic concern is the main reason due to cultural beliefs as well as self-worth (Handel *et al.*, 2014; Dlova *et al.*, 2019). Vitiligo has multiple genetic risk factors and environmental predictors. There is a complex association between the programming and function of the immune system as it is an autoimmune disease; however, paediatric vitiligo has been said to be linked to a family history (Silverberg *et al.*, 2015; Spritz and Andersen, 2017).

Previous data and available research suggest a link between vitiligo and comorbidities, which are important for treatment efficacy. For the treatment of vitiligo patients, the comorbidities must be evaluated and taken into consideration for the best possible interference (D'arino *et al.*, 2021). Moreover, psychological status and social issues are significant for adequate treatment. Our analysis identified a statistically significant association between co-morbidities and treatment efficacy, as a high percentage of lesion size decrease was seen for patients who were free of comorbidities. Three common co-morbidities—hypertension, DM, and anemia—also separately showed a statistically significant impact on treatment efficacy during the follow-up period (Bishnoi and Parsad, 2018).

According to a recent meta-analysis, longer treatment with phototherapy can enhance the treatment response and have high efficacy. The treatment of vitiligo with NB-UVB phototherapy for at least 6 months is required to assess its responsiveness (Bae *et al.*, 2017). Among the study participants, 77% received topical treatment, 76% received systemic treatment, and all of the participants received phototherapy (NB-UVB: 94%). The holistic treatment approach in our study showed an excellent treatment result after 6 months of follow up as there was no new lesion among participants, the size of the lesion decreased in 94% of cases, and repigmentation was seen in 96% cases.

The age of the participants showed a statistically significant association with treatment efficacy at six months; however, for the other two follow-ups, the association was not statistically significant. It is evident that treatment efficacy decreases with the increasing age of patients. Treatment efficacy was also higher among female participants, who usually have a lower chance of sun exposure or other factors. According to a previous study, the number of clinic visits was also found to increase with age (Tsadik *et al.*, 2020). There is no evidence for it. Vitiligo can be devastating for patients and, at times, very difficult to treat (Cavalié *et al.*, 2015; Rodrigues *et al.*, 2017).

5. Conclusions

It is difficult to apply any general rules regarding the choice of therapy for vitiligo; however, a holistic approach by an experienced physician is recommended for the best possible outcome. Our observation reveals the excellent efficacy of the holistic approach six months after treatment initiation. However, we can conclude that the presence of systemic diseases such as diabetes, hypertension, and thyroiditis, higher BSA involvement, and advanced age extend the treatment procedure and are also associated with a reduction in treatment efficacy. In Bangladesh, holistic treatment modalities for vitiligo by experienced specialists with evidence of significant improvement are now widely available. These will save patients from this extremely bad situation and stigma.

Data availability

The dataset that arose and was used in the current study is available from the corresponding author on reasonable request.

Conflict of interest

None to declare.

Authors' contribution

Md Mahabubur Rahaman, Anzirun Nahar Asma, and Morshad Alam equally contributed to research design, data analysis, and manuscript writing; Anzirun Nahar Asma, Ayesha Siddiqua, Rahmat Ullah Siddique and Sabrina Akter involved in data collection and data entry. All authors reviewed and approved the final version.

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