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## Quality of life and direct cost of illness among vitiligo patients in Tanta University Hospitals, Egypt

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### Abstract

**Background:** Vitiligo is the most common pigmentary disorder affecting skin melanocytes leading to skin depigmentation. It does not only affect the patients' appearance, but also affects their quality of life, compromising their mental health, social and work lives. Vitiligo has a significant financial impact due to the chronic nature and the long treatment course.

### Objectives:

1. To assess quality of life of vitiligo patients.
2. To estimate direct cost of illness of vitiligo and whether it represents a financial burden on patients.

**Methods:** A cross sectional study was carried out at the vitiligo unit of the Dermatology and Venereology Department in Tanta University Hospitals from October 2021 till March 2022. It included 66 vitiligo patients. A questionnaire was used to interview patients which consisted of the following parts (1) Socio demographic data. (2) Disease profile of patients. (3) Vitiligo life quality index (VLQI). (4) Direct cost of illness.

**Results:** 78.9% of patients suffered from quality of life impairment. Patients suffering from moderate effect represented 21.2%, followed by very large and extreme effect represented 19.7% each and patients suffered slight effect represented 18.2%. Meanwhile, only 21.2% of patients reported no affection. The mean direct cost of illness was  $340.9 \pm 280.4$  Egyptian pounds per month.

**Conclusion:** Most vitiligo patients suffered some degree of quality of life impairment. Nearly half of them reported having extreme financial impairment.

**Keywords:** Vitiligo, quality of life, cost of illness

### Introduction

Vitiligo is an acquired disorder characterized by circumscribed depigmented macules and patches caused by the loss of functioning melanocytes [1]. Vitiligo is characterized by appearance of localized or generalized depigmented patches of lighter skin affecting all body parts [2].

Worldwide (2012), vitiligo prevalence ranged from 0.5–2% with equal distribution in both genders and all ethnic groups [3, 4]. In Egypt, an epidemiological study (2020) performed in Damanhur Teaching Hospital reported a prevalence of 0.86% [5].

Quality of life (QoL) is defined by world health organization (WHO) as an individual's perception of their position in life in the context of the culture and values in which they live and in relation to their goals, expectations, standards and concerns [6].

Vitiligo affects patient's QoL in different aspects: physical, psychological, social, and occupational. Psychological aspect is the most influential factor affecting the QoL of vitiligo patients [7]. A study in the United States (2013) evaluated the associations between vitiligo extent, distribution of disease, and QoL impairment and reported that vitiligo had indeed a negative impact on total dermatology life quality index (DLQI) scores. The scores were significantly associated with an affected body surface area of greater than 25% and body parts affected [8].

Cost of illness (COI) analysis is the most obvious form of health economics study. A COI analysis measures the cost associated with a given disease. COI include three types; direct, indirect and intangible costs [9]. Direct costs consist of healthcare costs and non-healthcare costs. Indirect costs: refer to expenses resulting from the cessation or reduction of work productivity because of the morbidity and mortality associated with a given disease. Intangible costs: are pain, emotional impairment, health worry and other effects on the

patient's quality of life [10].

Measuring quality of life of vitiligo patients should be advised during their care to address the emotional, psychological & financial burden of the disease. This may ultimately lead to better adaptation of the disease and higher quality of life through different interventions.

#### Aim of work

1. To assess quality of life of vitiligo patients.
2. To estimate direct cost of illness of vitiligo and whether it represents a financial burden on patients.

#### Materials and Methods

##### Study Characteristics

Cross sectional study carried out carried-out at the outpatient clinic of the vitiligo unit at the Dermatology and Venerology Department in Tanta University Hospitals in Tanta City from October 2021 to March 2022.

##### Study inclusion criteria

Vitiligo patients aged 16 and older who were diagnosed at least one month prior.

##### Exclusion criteria

Vitiligo patients with other stigmatizing disorders or disabilities such as leprosy or facial deformities or those with chronic debilitating diseases and those who were mentally retarded or psychotic.

##### Study Tool

Data was collected by interviewing patients using a questionnaire consisted of four sections; the first section included the socio-demographic data of the patients: age, sex, residence, marital status, education, occupation, and special habits e.g., smoking, the second section contained the vitiligo history of the patients: type of vitiligo, duration, type of treatment, compliance to treatment, the third section included vitiligo life quality index (VLQI) which is a specific quality of life scale for vitiligo [11]. The fourth section was directed to estimate the direct cost of illness of vitiligo based on the patients' self-reported expenses in the prior month [12].

#### Scoring system

Vitiligo life quality index (VLQI) consisted of 25 questions. The answer to each question was scored as 'never = 1', 'sometimes = 2', 'often = 3' and 'all the time = 4', so the total score ranged between 25 and 100. Higher scores represented more severely impaired quality of life [11]. Stratification of VLQI scores was done based on the dermatology quality of life index ranging from no effect to extreme effect on patients' quality of life, percentiles were calculated for each score category 20th percentile at 32, 40th percentile at 38.8, 60th percentile at 44.2 & 80th percentile at 51.6 and categorized as shown in the following table

Score category	Percentiles	Scores
No effect on patient's life	≤20th percentile	≤32
Slight effect on patient's life	>20th ≤40th	>32≤38.8
Moderate effect on patient's life	>40th ≤60th	>38.8≤44.2
Very Large effect on patient's life	60th ≤80th	>44.2≤51.6
Extreme effect on patient's life	>80th	≥51.6

#### Sample Size and Statistical Analysis

All vitiligo patients attending the "vitiligo unit" during the period of data collection from October 2021 to March 2022 were considered as the study population, resulting in total 66 patients. Data were collected and entered an Excel sheet. Statistical analysis was performed using SPSS Package 25 for Microsoft Windows. Shapiro Wilk test was done to test the normality of the quantitative data. Qualitative data was summarized in numbers and percentage while quantitative data was summarized in mean and standard deviation for parametric data and median, Interquartile range for non-parametric data. Significance was tested whenever needed. The level of significance was adopted at the 5%, and the significance threshold (P value) was set at ≤ 0.05. The cost of the out-patient services, therapy and transportation were calculated for each patient during last four weeks in Egyptian pounds and presented in the form of minimum, maximum, mean & standard deviation.

#### Results

**Table 1:** Socio-demographic characteristics of the studied patients

Socio-demographic characteristics	Study participants (N= 66)	
	n	%
<b>Age (years)</b>		
16-20	17	25.8
>20-30	10	15.2
> 30-40	13	19.7
>40-50	11	16.7
> 50-70	15	22.7
Range Mean ± SD	16.0 - 70.0	35.9 ± 15.3
<b>Gender</b>		
Male	17	25.8
Female	49	74.2
<b>Residence</b>		
Urban	13	19.7
Rural	53	80.3
<b>Educational level</b>		
Illiterate	10	15.2
Primary	8	12.1
Secondary	12	18.2
Institute and university	36	54.5
<b>Occupation</b>		
Professional	3	4.5
Skilled manual worker	5	7.6
Unskilled manual worker	5	7.6

Housewife	29	43.9
Student	16	24.2
Not working	8	12.1
<b>Marital status</b>		
Single	20	30.3
Married	40	60.6
Divorced	1	1.5
Widow	5	7.6
<b>Income</b>		
Not enough	35	53.0
Just enough	28	42.4
Enough and saving	3	4.5

Table (1) shows that the mean age of the studied vitiligo patients was  $35.9 \pm 15.3$ , about three quarters of the participants were females (74.2%) and 80.3% of them lived in rural areas. More than half (53.5%) were highly educated.

43.9% of patients were housewives and 24.2% were students. Out of them 60.6% were married and about half (53.0%) reported not having enough income.

**Table 2:** Medical and family history of vitiligo patients

Variables	Study participants (N= 66)	
	n	%
<b>Medical history of chronic disease</b>		
Yes	28	42.4
No	38	57.6
<b>If yes, mention (N=28)</b>		
Hypertension	5	17.9
Thyroid disorders	3	10.7
Diabetes	2	7.14
Chronic lung disease (Asthma)	2	7.14
Chronic renal diseases	2	7.14
Others	14	50.0
<b>History of associated autoimmune disease (Systemic lupus erythematosus)</b>		
Yes	1	1.5
No	65	98.5
<b>History of associated skin condition (Acne)</b>		
Yes	2	3.0
No	64	97.0
<b>Family history of vitiligo</b>		
Yes	18	27.3
No	48	72.7
<b>Family history of other autoimmune disease</b>		
Yes	5	7.6
No	61	92.4
<b>If yes, mention(N=5)</b>		
Systemic lupus erythematosus	2	40.0
Psoriasis	1	20.0
Rheumatoid arthritis	1	20.0
Rheumatic fever	1	20.0

Table (2) shows that 42.4% of the studied participants had chronic disease mainly hypertension (17.8%), thyroid disorders (10.7%), diabetes (7.1%) and chronic lung disease (7.1%). Only 1.5% and 3% had other associated autoimmune namely systemic lupus erythematosus and history of chronic skin disease (acne) respectively. More

than one quarter had (27.3%) had a family history of vitiligo while 7.6% have a family history of other autoimmune disease namely systemic lupus erythematosus (40%), rheumatoid arthritis (20%), psoriasis (20%) and rheumatic fever (20%).

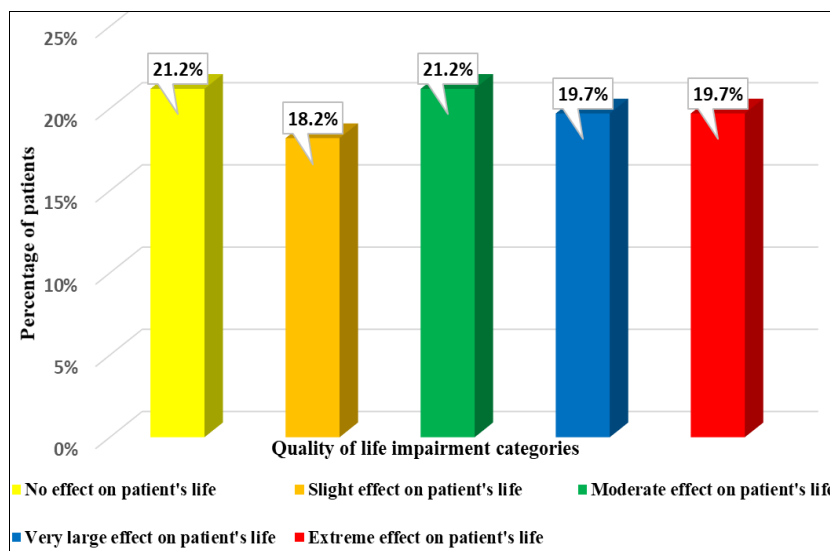
**Table 3:** Disease characteristics among vitiligo patients

Disease characteristics	Study participants (N= 66)	
	n	%
<b>Skin type</b>		
Type I and type II	-	-
Type III	11	16.7
Type IV	53	80.3
Type V	2	3.0
Type VI	-	-
<b>Type of vitiligo</b>		
Segmental	1	1.5
Non segmental	65	98.5
<b>Stability of vitiligo</b>		

Stable	21	31.8
Active	45	68.2
<b>Age of onset (years)</b>		
4≤10	6	9.1
>10-20	17	25.8
>20-30	10	15.2
>30-40	14	21.2
>40-50	11	16.7
>50-57	8	12.1
Range	4.0 - 57.0	
Mean ± SD	30.3 ± 15.5	
<b>Vitiligo duration (years)</b>		
≤ 1	20	30.3
>1-10	37	56.1
>10-20	5	7.6
>20-30	3	4.5
>30-46	1	1.5
Range	0.1 - 46.0	
Mean ± SD	5.6 ± 7.5	
<b>Involved areas of the body</b>		
Exposed	13	19.7
Unexposed	5	7.6
Both	48	72.7

Table (3) shows disease characteristics among the studied vitiligo patients. It was found that 80.3%, 16.7% and 3% of the participants had skin type IV, III and V respectively. Almost all participants (98.5%) suffered from non-segmental vitiligo and 68.2% were in an active state of vitiligo. The mean age of onset for vitiligo among

participants was 30.3 ± 15.5. While the mean for vitiligo duration was 5.6 ± 7.5. About three quarters of participants (72.7%) had vitiligo lesions involving both exposed and non-exposed parts of the body and 19.7% had exposed lesions only.



**Fig 1:** Distribution of quality of life impairment categories among vitiligo patients

Fig (1) shows that only 21.2% of participants have good quality of life while the rest (about 80%) have different degrees of quality of life impairments ranging from slight

effect on patients' quality of life (18.2%), moderate effect (21.2%), very large effect (19.7%) and extreme effect on patient's life (19.7%).

**Table 4:** Relationship between socio-demographic data and vitiligo life quality index scores among vitiligo patients

Socio-demographic characteristics	Vitiligo life quality index scores (N= 66)		Mann Whitney U	P value
	Median	IQR		
<b>Age(years)</b>				
≤ 30	41.00	38.0- 55.0	399.500	0.097
>30	41.00	31.0 - 48.0		
<b>Gender</b>				
Male	36.00	30.50- 42.00	274.500	0.037*
Female	43.00	35.00- 51.50		
<b>Residence</b>				
Urban	48.00	36.50- 59.00	234.000	0.075
Rural	41.00	32.00- 48.00		
<b>Educational level</b>			KWH	0.274

Illiterate and Primary	45.00	39.00- 51.50	2.591	
Secondary	39.50	31.25- 45.00		
Higher	39.50	34.00- 49.75		
<b>Occupation</b>				
Not working	46.00	38.50- 52.50	KWH 10.975	0.004*
Student	36.00	32.50- 41.75		
Working	37.00	27.00- 41.50		
<b>Marital status</b>				
Not married	39.00	33.50- 47.00	466.500	0.482
Married	42.50	35.00- 49.00		
<b>Income</b>				
Not enough	47.00	40.00- 52.00	KWH 12.440	0.002*
Just enough	37.50	32.00- 42.00		
Enough and saving	28.00	25.00-...		
<b>Smoking status</b>				
Smoker	32.50	25.00- 47.50	75.500	0.192
Non smoker	41.50	35.00- 49.00		

\*Statistically significant KWH: Kruskal-Wallis IQR: inter quartile range

Table (4) shows that there was a statistically significant difference between the median of gender, occupation and income (P= 0.037, 0.004 and 0.002) respectively and vitiligo life quality index scores.

**Table 5:** Relationship between disease characteristics and vitiligo life quality index scores among vitiligo patients

Disease characteristics	Vitiligo life quality index scores (N= 66)		Mann Whitney U	P value
	Median	IQR		
<b>Stability of vitiligo</b>				
Stable	38.00	33.00- 46.50	U 399.000	0.311
Active	42.00	35.00- 50.50		
<b>Involved areas of the body</b>				
Exposed	42.00	31.00- 54.00	KWH 2.298	0.317
Unexposed	34.00	30.00- 42.50		
both	41.50	35.25- 48.75		
<b>Repigmentation</b>				
Yes	39.00	32.00- 48.00	U 217.500	0.040*
No	46.00	41.00- 52.50		
Age of onset (years)			r = 0.199	0.109
Vitiligo duration (years)			r = - 0.105	0.403

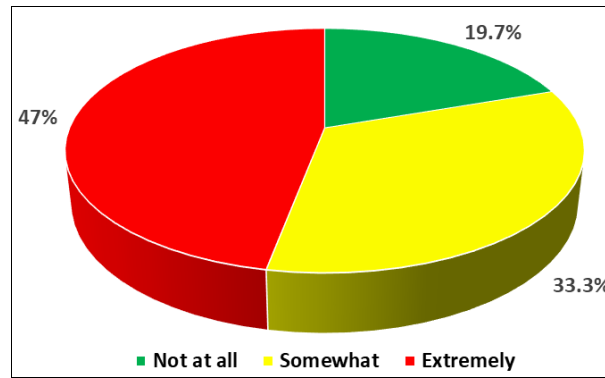
\*Statistically significant KWH: Kruskal-Wallis IQR: Inter quartile range

Table (5) shows that there was a statistically significant difference (P=0.040) between occurrence of repigmentation with median score 39 (IQR=32.0-48.0) and depigmentation with median score 46 (IQR=41.0-52.5). There was a weak positive correlation between age of onset and vitiligo life quality index scores and a weak negative correlation between duration of vitiligo and vitiligo life quality index scores.

**Table 6:** Direct cost of illness per month among vitiligo patients

Direct costs	Minimum	Maximum	Mean	Standard Deviation (SD)	Fraction of grand total
<b>Direct medical costs</b>					
Cost of outpatient services	0	200	9.7	34.5	1.8%
Cost of systemic therapy	0	200	25.6	41.7	8.2%
Cost of topical therapy	0	900	102.7	144.1	24.9%
Cost of phototherapy(NBUVB)	0	360	82.3	110.2	19.4%
Cost of PUVA	0	0	0	0	0%
Cost of tanning agents	0	0	0	0	0%
Cost of concealing agents	0	0	0	0	0%
Cost of minor surgery	0	0	0	0	0%
Cost of minimal invasive (treatment sessions with 5 Fluro-uracil)	0	150	2.3	18.5	0.4%
Total medical costs	0	1260	222.6	227.9	54.8%
<b>Direct non-medical costs</b>					
Transportation costs to care provider	20	720	118.3	113.5	45.2%
Grand total costs	30	1680	340.9	280.4	100%

Table (6) shows that topical therapy cost was the highest (102.7±144.1) while cost of phototherapy (NBUVB) was 82.3 ±110.2 and lastly cost of systemic therapy 25.6±41.7. Also, it was found that about half (52.9%) of the grand total cost is spent on therapy while transportation accounts for 45.2% and cost of services accounts for only 1.8% of the grand total cost.



**Fig 2:** Categories of presumed financial impairment among vitiligo patients

Fig (2) shows vitiligo patients' opinions regarding their perceived financial impairment due to vitiligo. It was found that 47% reported having extreme impairment, 33.3% a

somewhat financial impairment and 19.7% reported having no impairment.

**Table 7:** Relationship between financial impairment and vitiligo life quality index score among vitiligo patients.

Financial impairment	Vitiligo life quality index scores		Test of significance	P value
	Median	IQR		
Not at all	35.00	29.50-42.50	Kruskal-Wallis H 6.423  r = 0.308	0.040*
Somewhat	41.00	31.75-49.25		
extremely	44.00	39.00 - 51.00		

\*Statistically significant r: Spearman's rho correlation coefficient

Table (7) shows that there was a statistically significant association between financial impairment categories and vitiligo life quality index scores (P=0.040). The median score among participants reported no financial impairment was 35.0 with IQR (29.50 - 42.50), the median score among participants reported a somewhat financial impairment was 41.0 with IQR (31.75 - 49.25) and the median among those reported extreme impairment is 44 with IQR (39.00 - 51.00). Also, there was a statistically significant positive weak correlation between financial impairment categories and vitiligo life quality index scores (P = 0.012- r = 0.308)

**Discussion**

Female patients constituted 74.2% of participants. This was in line with Yang T-T. *et al.*, (2022) in Taiwan, Al-shammari SA. *et al.*, (2021) in Saudi Arabia, Anaba EL. *et al.*, (2020) who reported a higher female proportion of 60.1%, 65.6% and 51.7% respectively [13-15]. This was probably because women are usually subjected to a worse negative social impact than males and the common beauty seeking attitude prevailing among them. Hence, women are more active in seeking treatment for vitiligo [16, 17]. The current study reported that 27.3% of patients had family history of vitiligo which goes hand in hand with Hooshmand AM. *et al.*, (2021) in Afghanistan who reported that 26.5% of patients had a relative suffering from vitiligo [18]. This was probably because vitiligo has familial inheritance [19]. The current study reported that about 80% of patients suffered from QoL impairment in varying degrees. Patients suffering from moderate effect represented 21.2%, followed by very large and extreme effect which represented 19.7% each and eventually patients suffered slight effect represented 18.2%. Meanwhile only 21.2% of all patients reported no affection of their quality of life. Similarly Kota RS. *et al.*, (2019) in India reported that 85.3% of participants suffered from QoL impairment, still their distribution was different for each impairment category; 34.7% patients were found to have small effect on QoL, 26% had moderate, 23.3% had very large and 1.3% had extremely large effect on QoL. Meanwhile only 14.7%

of patients had no or minimal effect on QoL [20]. In addition, Hussain A. *et al.*, (2022) in Faisalabad reported that the effect of vitiligo was classified as follows: no effect 10.4%, mild effect 24.0%, moderate effect 34.4%, very large effect 17.6% and extremely huge effect 13.6% [21]. The effect on patients' quality of life is evident in all studies due to the high stigma against vitiligo patients as it is considered cosmetic skin disease. Similar to the current study, Anaba EL. *et al.* (2020) in Nigeria reported that 96.6% of participants suffered QoL impairment, however, 44.8% of them reported extreme impairment. This higher percentage probably originated from the fact that all participants in that study were newly diagnosed vitiligo patients [15].

**Relationship between socio-demographic characteristics and quality of life among vitiligo patients**

The current study revealed a statistically significant difference between the median VLQI score among female and male patients. Similarly, Hedayat K. *et al.* (2016) in Iran reported a statistically significant difference between the median VitiQoL score among female and male patients. (4) This was because female patients are more sensitive toward their appearance [20]. In contrast, Al-shammari SA. *et al.*, (2021) in Saudi Arabia, Silpa-Archa. *et al.*, (2020) in Thailand and Anaba EL. *et al.*, (2020) in Nigeria reported no statistically significant difference between the median DLQI and VitiQoL scores among both sexes [14, 2, 15]. However, women are thought to be more bothered by their skin than men which is evident in the current study. So, this dissimilarity could be attributed to amount of disease education and cultural stigma in different communities.

**Relationship between disease characteristics, therapeutic characteristics, and vitiligo patients' QoL**

The present study reported that there was a statistically significant difference when comparing the median VLQI score among patients with repigmentation of lesions and those who are not. (Table 10) Similarly, Hooshmand AM. *et*

*al.*, (2021) in Afghanistan reported a statistically significant difference between DLQI score and response to treatment<sup>(1818)</sup>. This might be because patients who are improving with treatment would suffer less stress worrying about disease progression hence, they suffered less QoL impairment.

### Direct cost of vitiligo

Results of the current study revealed that total medical cost borne by patients is mainly spent on topical treatment followed by NBUVB therapy due to the long course of these types of treatment. The cost of topical treatment represented about one quarter of the whole cost borne by patients and varied according to the extent of skin lesion and patients' compliance to the frequency of application recommended by the dermatologist. It ranged from a zero cost in cases who received treatment on state expense to 900 Egyptian pounds per month in patients who solely bear their treatment cost.

A study by Moon Tang M. *et al.*, (2013) in Malaysia revealed that most of the money was spent on topical medications, followed by systemic medications. The estimated average cost of illness for psoriasis was 1307.47 Ringgit Malaysia per person per year, excluding costs of hospitalization<sup>[22]</sup>.

A study by Shehata WM. *et al.*, (2015) in Egypt reported that direct costs ranged from 15- 1006 Egyptian pounds per month (208.33 ± 166.197) among psoriatic patients. The direct medical cost accounted for more than three quarters of total cost (75.8%) comparing to only 18.2% due to transportation (Direct non-medical cost)<sup>[12]</sup>.

Direct cost of illness is not well addressed but results of the present study showed that financial burden among vitiligo patients is similar to other chronic skin diseases with visible symptoms such as psoriasis.

### Conclusion and Recommendations

Most vitiligo patients suffered quality of life impairment in different degrees ranging from slight to extreme impairment. Regarding the cost of illness, patients spent slightly more than half of the total cost on their medical treatment and the remaining for transportation to healthcare providers. The majority of medical costs were for topical treatment followed by phototherapy. Nearly half of vitiligo patients reported that these costs posed an extreme financial burden. Based on the results of our study, it is recommended to incorporate assessing quality of life, even better psychological screening for common disease such as depression and anxiety in management plan of patients. Provide financial support for patients treated for vitiligo who aren't eligible to receive treatment on state expense.

### Conflict of Interest

Not available

### Financial Support

Not available

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