ORIGINAL ARTICLE

Quality of life and willingness to pay in patients with androgenetic alopecia

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ABSTRACT

Background: Androgenetic alopecia has been well documented to have a negative impact on self-confidence and self-esteem. The dermatology life quality index is a dermatology-specific quality of life measurement that has been used in many skin diseases. There is paucity of data regarding the effect of androgenetic alopecia on quality of life from the Middle Eastern populations. Willingness to pay represents a tool to evaluate the burden of disease.

Objective: To assess quality of life of Androgenetic alopecia patients. A secondary aim was to determine the correlation between dermatology life quality index and Willingness to pay among subjects of different disease durations, severity and socioeconomic factors.

Methods: A self-administered multiple choice questionnaire distributed to subjects diagnosed with androgenetic alopecia attending dermatology clinic at 3 specialized hospitals in Riyadh from June 2016 to March 2017.

Results: Of the 233 subjects, 207 (88%) completed the questionnaires. The dermatology life quality index scores ranged from 0 to 29, with a mean score of 7.8 ± 5.8 indicating a moderate effect on quality of life. In 28.5% of subjects, quality of life was affected very large to extremely by androgenetic alopecia. Females showed a significantly higher Willingness to pay than males ($P<0.001$).

Conclusion: The present study suggests a moderate effect of androgenetic alopecia on the quality of life. Androgenetic alopecia has more impact on females than in males and they are more willing to pay than males. More studies should pay more attention on the psychological status of patients with androgenetic alopecia.

KEY WORDS: Alopecia; androgenetic; quality of life; willingness to pay

INTRODUCTION

Androgenetic alopecia (AGA) is the most common cause of hair loss in men and women. It has been well documented to have a negative impact on self-confidence and self-esteem.[1,2] Psychiatric disorders are also common in patients with AGA.[3,4] AGA is present in 50% of men in their fifties, while 70% of men and 38% of women at older ages are affected.[5] Although this disorder is highly prevalent, the current treatments have limited efficacy.[6]

The dermatology life quality index (DLQI) is a dermatology-specific quality of life (QoL) measurement that has been used in many skin diseases. The effect of AGA on QoL was previously assessed in a few populations,[7-10] however, there is paucity of data in this regard from the Middle Eastern populations. Willingness to pay (WTP) represents a tool to evaluate the burden of disease focusing on the amount of money patients are

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willing to pay for a hypothetical cure of their disease.[11] In dermatology, a few studies have evaluated WTP in patients with skin diseases. WTP has been used for patients with psoriasis vulgaris,[12] atopic dermatitis,[13] port wine stains,[14] basal cell carcinoma,[15] melanocytic naevi,[16] rosacea,[17] vitiligo,[18] onychomycosis,[19] melasma[20] and acne vulgaris.[21] To our best knowledge, the use of WTP in patients with AGA has not been reported.

The purpose of this study is to assess QoL of AGA in Saudi Arab population, and to determine the relationship of DLOI scores to demographic data and clinical variables. A secondary aim was to determine the correlation between DLQI and WTP among subjects of different disease durations, severity and socioeconomic factors.

MATERIALS AND METHODS

A self-administered multiple choice questionnaire distributed to all patients older than 18 years diagnosed with AGA attending dermatology clinic at 3 specialized hospitals in Riyadh from June 2016 to March 2017. All patients were mentally and physically healthy. Patients with seborrheic dermatitis, scalp disorders, such as scalp psoriasis or scalp infection were excluded. All patients were informed verbally about the study and were asked to voluntarily participate in this survey by filling the questionnaire according to their feelings and opinions. The study was approved by the our institution's ethics committee.

Demographic and clinical data were collected on each patient. The extent of AGA was assessed by a board certified dermatologist using Hamilton – Norwood and Ludwig's grading systems for male and female respectively.

The DLQI questionnaire consists of 10 questions, each referring to the previous 7 days. It covers symptoms and feelings, daily activities, leisure, work and school, personal relationships, and treatment as dimensions of life. Each item scored 0-3. Scores are added to yield a total DLQI of 0-30; higher scores mean greater impairment of the patient's QoL.[22]

The Arabic version of the DLQI was used here. "Banding" of DLQI scores allows this measure to be clinically useful.[23] Grade 1 (0-1) means no effect at all on patient's life, similarly, grade 2 (2-5) means small, grade 3 (6-10) means moderate, grade 4 (11-20) means very large, and grade 5 (21-30) means extremely large effect on patient's life. WTP was addressed by asking one question about the amount of money they would be willing to pay as a single payment to achieve a sustainable cure of AGA. Predefined categories: 200-1000 USD, 1001-5000 USD, 5001-10000 USD. In theory, the more the patients are willing to pay, the more they are impaired in their QoL by the disease. A correlation with income has been done.

Data were analyzed using SPSS® version 20.0 (IBM Inc., Chicago, Illinois, USA). The relationships between DLQI scores and clinical and demographic variables were analyzed using ordinal multiple logistic regression. Reliability was assessed by average inter-item correlation, item total correlation, and Cronbach's alpha. $P < .05$ was interpreted as statistically significant.

RESULTS

Of the 233 patients who had received questionnaires, 207 patients completed the questionnaires (response rate was 88.8%) and were included in the analysis.

Patient demographics

207 patients (96 male and 111 female) with an average age of 30.6 ± 9.1 years were enrolled. The average disease duration was 6 ± 4.8 years. De-

mographic and clinical characteristics are shown in Table 1.

Table 1 Demographic and clinical characteristics for patients with AA (n=207)

Characteristic	N (%)
Gender	
Male	96 (46.4)
Female	111 (53.6)
Mean age in years, Mean ±SD	30.6± (9.1) [17-80]
Median age in years	28
Marital status	
Single	107 (51.7)
Married	92 (44.4)
Divorced/Separated	2 (1.0)
Widowed	1 (0.5)
No answer	5 (2.4)
Education level	
Primary	7 (3.4)
Secondary	27 (13.0)
Diploma/Bachelors	137 (66.2)
Postgraduate	28 (13.5)
No answer	8 (3.9)
Mean disease duration in years, Mean ±SD	6.0± (4.8) [3 months – 25 years]
Median disease duration in years	4.5 years
Monthly Income in USD	
No answer	50 (24.2)
≤ 5,376	109 (52.7)
> 5,376	48 (23.1)
Willingness to pay (USD)	
100 – 1,000	47 (46.8)
1,001 – 5,000	69 (33.3)
5,001 – 10,000	41 (19.8)
Willingness to pay in USD Mean ±SD	1,1012.9 (1,014.4)
Grading	
H1	10 (10.4)
H2	12 (12.5)
H3	24 (25.0)
H4	15 (15.6)
H5	21 (21.9)
H6	12 (12.5)
H7	2 (2.1)
N1	78 (70.3)
N2	28 (25.2)
N3	5 (4.5)

DLQI scores

The DLQI scores ranged from 0 to 29, with a mean score of 7.8 ± 5.8. As shown in Table 2. In 28.5% of cases, patients' QoL was affected very large to extremely by AGA.

The individual mean scores ranged from 0.21 to 1.48. Questions 2 (embarrassment) and question 4 (clothing) had the most impact on AGA patients. The lowest was for question 9 (sexual life) and question 6 (sport activity) (Table 3).

QoL was not affected by the patient's age, disease duration, marital status, and educational level. However, gender was associated with significantly higher DLQI score (P< 0.001). QoL was impaired in females more than males (Table 4).

Table 2 DLQI scores for 207 androgenetic alopecia

AA Patients n (%)	Range of score	QoL effect
28 (13.5)	0–1, Grade 1	No effect
55 (26.6)	2–5, Grade 2	Small effect
65 (31.4)	6–10, Grade 3	Moderate effect
53 (25.6)	11–20, Grade 4	Very large effect
6 (2.9)	21–30, Grade 5	Extremely large effect

Willingness to pay

WTP was determined to express the burden of the disease further. Majority of subjects (52.7%) had a monthly household income of 5,376 USD or less and hence are eligible for the governmental aid (citizen account) at the time of data acquisition. Of all patients, 46.8% were willing to make a single payment up to 1,000 USD for a cure, 33.3% would pay up to 5,000 USD and 19.8% up to 10,000 USD (Table 1).

Female patients showed a significantly higher WTP than males (P<0.001). Age and duration of AGA do not significantly correlate with more

Table 3 Mean DLQI item scores for 207 AA patients

DLQI items	Score n (%)				Mean DLQI score mean ±SD
	0	1	2	3	
Q1	81 (39.1)	84 (40.6)	32 (15.5)	10 (4.8)	.86±.85
Q2	41 (19.8)	63 (30.4)	66 (31.9)	37 (17.9)	1.48±1.00
Q3	125 (60.4)	41 (19.8)	29 (14.0)	12 (5.8)	.65±.93
Q4	97 (46.9)	51 (24.6)	30 (14.5)	29 (14.0)	.96±1.09
Q5	100 (48.3)	61 (29.5)	26 (12.6)	20 (9.7)	.84±.99
Q6	146 (70.5)	41 (19.8)	12 (5.8)	8 (3.9)	.43±.77
Q7	124 (59.9)	36 (17.4)	21 (10.1)	26 (12.6)	.75±1.07
Q8	104 (50.2)	49 (23.7)	32 (15.5)	22 (10.6)	.86±1.03
Q9	177 (85.5)	21 (10.1)	5 (2.4)	4 (1.9)	.21±.58
Q10	114 (55.1)	54 (26.1)	24 (11.6)	15 (7.2)	.71±.94

Table 4 Average DLQI scores in AA patients with various demographical and clinical presentations

Variable	Category	N (%)	MEAN DLQI score (mean ±SD)	*p*-value
Gender	Male	96 (46.4)	6.4±5.4	0.001*
	Female	111 (53.6)	9.0±5.9	
Age (years)	<40	168 (81.2)	7.6±5.8	0.618
	≥40	27 (13.0)	8.4±6.5	
Duration of disease (years)	<12	159 (89.3)	7.7±5.8	0.584
	≥12	19 (9.2)	6.7±4.9	
Marital status	Single	110 (53.1)	7.4±5.2	0.614
	Married	92 (44.4)	8.2±6.5	
Education level	Secondary and below	34 (16.4)	9.1±7.0	0.349
	Higher than secondary	165 (79.7)	7.6±5.6	

Table 5 Factors associated with willingness to pay

Variable		WILLINGNESS TO PAY			*P* value
		200 – 1,000 USD (n=97) n(%)	1,001 – 5,000 USD (n=69) n(%)	5,001 – 10,000 USD (n=41) n(%)	
Gender	Male (n=96)	33 (34.4)	47 (49.0)	16 (16.7)	0.001*
	Female (n=111)	64 (57.7)	22 (19.8)	25 (22.5)	
Age (years)	<40 (n=168)	79 (47.0)	55 (32.7)	34 (20.2)	0.503
	≥40 (n=27)	15 (55.6)	9 (33.3)	3 (11.1)	
Duration of disease (years)	<12 (n=159)	74 (46.5)	54 (34.0)	31 (19.5)	0.218
	≥12 (n=19)	7 (36.8)	5 (26.3)	7 (36.8)	
Marital status	Single (n=110)	45 (40.9)	39 (35.5)	26 (23.6)	0.065
	Married (n=92)	52 (56.5)	27 (29.3)	13 (14.1)	
Education level	Secondary and below (n=34)	23 (67.6)	8 (23.5)	3 (8.8)	0.038*
	Higher than secondary (n=165)	73 (44.2)	57 (34.5)	35 (21.2)	
Monthly income (USD)	≤5,376 (n=109)	55 (50.5)	35 (32.1)	19 (17.4)	0.047*
	>5,376 (n=48)	14 (29.2)	22 (45.8)	12 (25.0)	

Table 6 Correlating severity of androgenetic alopecia with willingness to pay

	SEVERITY LEVELS *			
Willingness to Pay	**Mild (n=124) n(%)**	**Moderate (n=64) n(%)**	**Severe (n=19) n(%)**	***P* value**
200 – 1,000 USD (n=97)	72 (74.2)	19 (19.6)	6 (6.2)	0.004*
1,001 – 5,000 USD (n=69)	33 (47.8)	28 (40.6)	8 (11.6)	
5,001 – 10,000 USD (n=41)	19 (46.3)	17 (41.5)	5 (12.2)	

Mild=H1, H2, H3, N1, Moderate=H4, H5, N2, Severe=H6, H7, N3

WTP. Table 5. Surprisingly, WTP was significantly higher in patients with mild AGA than those with sever AGA (P-value 0.004). Table 6.

Internal consistency and concurrent validity

The value of Kaiser–Meyer–Olkin measure (KMO = .845) and Bartlett's test of sphericity =45 (P<0.001) support for factor analysis. Two factors were extracted from the factor solution of the DLQI items as shown in Table 7. They together accounted for 61.3% of the variance in DLQI score in this setting. The factors were, first, items 2,3,4,5,6,7,8 and 10. These items refer to the emotional and social effects of AGA. Second, items 1 and 9 refer to the physiological effects. Cronbach's alpha (scale reliability coefficient) for the DLQI score was .820, and the standardized item alpha was .820, both higher than the traditional threshold of .7, indicating a high degree of internal reliability. The average inter-item correlation was 0.313 (>.2), suggesting good reliability. The item total correlation ranged from .289 to .661. The average item total correlation was .505.

Table 7 Factor loadings (rotated)* of two - factor solution

DLQI Items	Factor 1	Factor 2
Q1	-.018	.688
Q2	.656	.313
Q3	.601	.282
Q4	.780	.080
Q5	.836	.152
Q6	.732	.123
Q7	.327	.493
Q8	.466	.533
Q9	.116	.668
Q10	.288	.570

DISCUSSION

AGA is one of the most common hair loss disorders that can significantly affect a patient's QoL and it is associated with various psychological consequence (1-4). The mean DLQI score in our study was 7.8 ± 5.8, indicating a moderate impact on QoL. This is comparable to that found in previous studies in other countries 8-11 and it is clearly lower than the result reported in patients with other chronic dermatological diseases e.g. Atopic dermatitis (12.5), pruritus (10.5), pemphigus vulgaris (10.0), epidermolysis bullosa (12.1), and burn (17.7).[24-28]

We observed that the DLQI score and WTP for women were significantly higher than that for men indicating a worse QOL in women with AGA as compared to men. This can be attributed to the fact that females are more conscious about their cosmetic appearance than men. Moreover, studies have revealed that women with AGA experience increased self-consciousness, feelings of unattraction, social withdrawal, emotional stress and worry as a result of hair loss compared with women without hair loss or men with hair loss.[29-31]

In our population, QoL was not affected by duration of the disease. This is contradicting previous findings in QOL study in Korean[10] and Chinese populations.[32] A possible explanation for that, patients may gradually adapt to their chronic disease, such as AGA, and as the time passes, their QOL

gradually improves. In addition, QoL was also not affected by the patient's age. Other studies reported a worse QoL in younger age patients.[32] Younger patients are probably more likely to have a negative impact of their appearance on their social life as they are looking for work and partners. However, cultural differences may present, as our population usually wear special costumes that cover the men's head (Qutra) or women's head (Hejab).

WTP was significantly higher in patients with mild AGA than those with severe AGA. Patient with mild AGA are probably more interested in preventing the disease from being worse.

A questionnaire is considered to be internally consistent when there is a high correlation among the scores of items. This inter-correlation is expressed by Cronbach's alpha. The minimum requirement for an instrument to be internally consistent is a value of .70.[33] Several investigators have assessed the internal reliability of the DLQI for other diseases, and have demonstrated Cronbach's alpha scores of between .77 and .95.[34,35] Among patients with AGA of our study, Cronbach's alpha was 0.820, indicating high internal reliability.

The limitation of our study was small sample size as compared to the total population of AGA patients in Saudi Arabia. The information regarding illness perception, psychological distress, and QoL was being self-reported and thus might have recall bias. Additionally, all the patients in our study were chosen from dermatology clinics came for hair problem, selection bias may affect the result.

In summary, the present study suggests a moderate effect of AGA on the QoL of affected patients. AGA has more impact on females than in males and they are more WTP than males. More studies should pay more attention on the psychological status of patients with AGA, although it is not life-threatening. In diseases like AGA with limited treatment options, it is important to recognize the psychological issues of patients and offer both medical treatment as well as psychological support.

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REFERENCES

1. Williamson D, Gonzalez M, Finlay AY. The effect of hair loss on quality of life. J Eur Acad Dermatol Venereol 2001; 15:137-39.
2. Cash TF. The psychosocial consequences of androgenetic alopecia: a review of the research literature. Br J Dermatol 1999 Sep; 141 (3):398-405.
3. Hadshiew IM, Foitzik K, Arck PC, et al. Burden of hair loss: stress and the underestimated psychological impact of telogen effluvium and androgenetic alopecia. J Investig Dermatol 2004; 123:455-57.
4. Hunt N, McHale S. The psychological impact of alopecia. BMJ 2005; 331:951-53.
5. Mubki T, Shamsaldeen O, McElwee KJ, et al. An update on diagnosis and treatment of female patter hair loss. Expert Rev Dermatol 2013; 8 (4):427-36.
6. Adil A, Godwin M. The effectiveness of treatments for androgenetic alopecia: A systematic review and meta-analysis. J Am Acad Dermatol 2017 Jul; 77 (1):136-41.
7. Yu NL, Tan H, Song ZQ, et al. Illness perception in patients with androgenetic alopecia and alopecia areata in China. J Psychosom Res 2016; 86, 1-6.
8. Cartwright T, Endean N, Porter A. Illness perceptions, coping and quality of life in patients with alopecia. Br J Dermatol 2009; 160:1034-39.
9. Yamazaki M, Miyakura T, Uchiyama M, et al. Oral finasteride improved the quality of life of androgenetic

alopecia patients. The Journal of Dermatology 2011; 38:773-77.
10. Han SH, Byun JW, Lee WS, et al. Quality of life assessment in male patients with androgenetic alopecia: result of a prospective, multicenter study. Ann Dermatol. 2012 Aug; 24 (3):311-8.
11. O'Brien B, Gafni A. When do the "dollars" make sense? Toward a conceptual framework for contingent valuation studies in health care. Med Decis Making 1996; 16:288-99.
12. Schiffner R, Schiffner-Rohe J, Gerstenhauer M, et al. Willingness to pay and time trade-off: sensitive to changes of quality of life in psoriasis patients? Br J Dermatol 2003; 148:1153-60.
13. Lundberg L, Johannesson M, Silverdahl M, et al. Quality of life, health-state utilities and willingness to pay in patients with psoriasis and atopic eczema. Br J Dermatol 1999; 141:1067-75.
14. Schiffner R, Brunnberg S, Hohenleutner U, et al. Willingness to pay and time trade-off: useful utility indicators for the assessment of quality of life and patient satisfaction in patients with port wine stains. Br J Dermatol 2002; 146:440-7.
15. Weston A, Fitzgerald P. Discrete choice experiment to derive willingness to pay for methyl aminolevulinate photodynamic therapy versus simple excision surgery in basal cell carcinoma. Pharmacoeconomics 2004; 22:1195-208.
16. Schiffner R, Wilde O, Schiffner-Rohe J, et al. Difference between real and perceived power of dermoscopical methods for detection of malignant melanoma. Eur J Dermatol 2003; 13:288-93.
17. Beikert FC, Langenbruch AK, Radtke MA, et al. Willingness to pay and quality of life in patients with rosacea. Journal of the European Academy of Dermatology and Venereology 2013; 27:734-38.
18. Radtke MA, Schäfer I, Gajur A, et al. Willingness-to-pay and quality of life in patients with vitiligo. British Journal of Dermatology 2009; 161:134-39.
19. Cham PMH, Chen SC, Grill JP, et al. Reliability of self-reported willingness-to-pay and annual income in patients treated for toenail onychomycosis. British Journal of Dermatology 2007; 156:922-28.
20. Leeyaphan C, Wanitphakdeedecha R, Manuskiatti W, et al. Measuring melasma patients' quality of life using willingness to pay and time trade-off methods in thai population. BMC Dermatology 2011; 11:16.
21. Motley RJ, Finlay AY. How much disability is caused by acne? Clin Exp Dermatol 1989; 14:194-8.
22. Finlay AY, Khan GK. Dermatology Life Quality Index (DLQI)–A simple practical measure for routine clinical use. Clinical and Experimental Dermatology 1994; 19:210-16.
23. Hongbo Y, Thomas CL, Harrison MA, et al. Translating the science of quality of life into practice: What do dermatology life quality index scores mean? The Journal of Investigative Dermatology 2005; 125:659-64.
24. Holm JG, Agner T, Clausen ML, et al. Quality of life and disease severity in patients with atopic dermatitis. J Eur Acad Dermatol Venereol 2016 Oct; 30 (10):1760-67.
25. Warlich B, Fritz F, Osada N, et al. Health-Related Quality of Life in Chronic Pruritus: An Analysis Related to Disease Etiology, Clinical Skin Conditions and Itch Intensity. Dermatology 2015; 231 (3):253-9.
26. Mayrshofer F, Hertl M, Sinkgraven R, et al. Significant decrease in quality of life in patients with pemphigus vulgaris. Results from the German Bullous Skin Disease (BSD) Study Group. J Dtsch Dermatol Ges 2005; 3:431-35.
27. Horn HM, Tidman MJ. Quality of life in epidermolysis bullosa. Clin Exp Dermatol 2002; 27:707-10.
28. Mazharinia N, Aghaei S, Shayan Z. Dermatology Life Quality Index (DLQI) scores in burn victims after revival. J Burn Care Res 2007; 28:312-17.
29. Cash TF, Price VH, Savin RC. Psychological effects of androgenetic alopecia on women: comparisons with balding men and with female control subjects. J Am Acad Dermatol 1993; 29:568-75.
30. Van der Donk J, Passchier J, Knegt-Junk C, et al. Psychological characteristics of women with androgenetic alopecia: a controlled study. Br J Dermatol 1991; 125:248-52.
31. Van Der Donk J, Hunfeld JA, Passchier J, et al. Quality of life and maladjustment associated with hair loss in women with alopecia androgenetica. Soc Sci Med 1994; 38:159-63.
32. Zhang M, Zhang N. Quality of life assessment in patients with alopecia areata and androgenetic alopecia in the People's Republic of China. Patient Prefer Adher-

ence 2017 Jan 27; 11:151-55.

33. Streiner DL, Norman GR, Cairney J (eds). Health measurement scales: A practical guide to their development and use. 5th Ed. Oxford: Oxford University Press; 2014.
34. Aghaei S, Sodaifi M, Jafari P, et al. DLQI scores in vitiligo: Reliability and validity of the Persian version. BMC Dermatology 2004; 4:4-8.
35. Jalel A, Soumaya GS, Hamdaoui MH. Dermatology life quality index scores in vitiligo: Reliability and validity of the Tunisian version. Indian Journal of Dermatology 2009; 54:330-33.