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Professional paper

PRESBYOPIA: DIFFERENCE IN QUALITY OF LIFE ACCORDING TO GENDER AND EDUCATION

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Abstract

Presbyopia develops gradually, affecting the eye's ability to focus on nearby objects. In general, visual impairments can reduce an individual's quality of life by limiting learning opportunities and independence. This study aims to gather empirical evidence on how quality of life varies among people with presbyopia, taking into account factors such as gender and level of education. Seventy-eight adults completed the National Eye Institute 39-Question Visual Function Questionnaire (NEI VFQ-39). Analysis based on gender shows that in most aspects the differences between male and female respondents are not statistically significant. However, an exception was found in the subscale measuring dependence on help from others, which showed a significant difference ($p<0.05$). Specifically, in this sample, men with presbyopia perceived their quality of life as significantly lower in terms of independence in daily life. Using the ANOVA test, it was determined that the level of education of the respondents significantly affects their responses to five subscales: general health ($F=5.265$, $df=2$, $p<0.007$), distance activities ($F=7.025$, $df=2$, $p<0.002$), social functioning ($F=4.011$, $df=2$, $p<0.05$), role difficulties ($F=3.131$, $df=2$, $p<0.05$), and dependency ($F=5.029$, $df=2$, $p<0.009$).
In conclusion, our research showed that the gender of presbyopic patients is not correlated with quality of life, while the level of education significantly affects different aspects of their quality of life.

Keywords: Quality of life, presbyopia, gender, education.

Introduction

Presbyopia is a normal age-related eye condition characterized by impaired near vision due to weakened accommodation, resulting from a physiological decrease in the amplitude of accommodation. This variation depends on individual factors such as occupation, refractive error, and temperament. For example, some people feel anxious even with minor near vision impairments, while others only recognize issues when reading newspaper headlines. Known since ancient times, presbyopia presented a serious societal challenge. In 100 AD, Plutarch speculated about its mechanistic causes (Barbero 2014). Although everyone is affected by presbyopia, symptoms can vary. The primary risk factor is age, although it can also occur due to other factors such as disease, trauma, and medications (American Optometric Association, 2010).
Globally, it is estimated that more than half of adults over the age of 50 have presbyopia. This prevalence rises to over 50% in developing countries, where awareness and availability of treatment options are limited (Hookvay et al., 2016). In some cases, up to 34% of countries, including developed ones, do not have adequate near vision correction. This deficiency has implications for task performance and productivity (Frick al., 2015; Kidd Man et al., 2016; Zebardast et al., 2017). Even in developed countries, increased digital demands are associated with asthenopia, possibly due to latent adaptive dysfunction in people in their thirties. This condition represents a largely undiagnosed early-onset form of presbyopia (Reindel et al., 2018). Namely, presbyopia is a global problem affecting 1.8 billion people worldwide. However, as of 2015, at least 826 million of them did not have adequate presbyopia correction.

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Presbyopia can only be corrected with glasses, contact lenses, or refractive surgery, or it can be treated with a magnifying glass (Charman, 2014). However, it is important to note that these corrections come with a financial burden (Naidoo et al., 2016). There is currently no treatment that reverses the effects of aging on the lens, returning the eye to "true" dynamic accommodation (Wolffsohn & Davies, 2019).

The term quality of life (QOL) includes not only physical health, but also factors such as psychological well-being, level of independence, social relationships and environmental considerations. The World Health Organization (WHO, 1995) defined quality of life "as an individual's perception of his position in life in the context of the culture and value system in which he lives and his goals, expectations, standards and perceptions". In general, vision impairment certainly affects a lower QOL. But only a few studies have been conducted to assess the impact of presbyopia on the quality of life of affected individuals. The aim of this study is to determine the differences in the QOL according to gender and level of education of people with presbyopia.

Materials and methods

2.1. Study Population: A total of 78 participants aged over 41 years, who had presbyopia and were patients of "Retina" Optics from Tetovo, participated in this study. All of them were properly informed and consented, and the study adhered to the principles of the Declaration of Helsinki. Of the 78 participants with presbyopia, 46 (59%) were females, and 32 (41%) were males. In terms of gender representation, it was observed that the female gender prevails, with an approximate ratio of 3:2, i.e. 59% to 41%. There was no significant difference in the distribution of gender ($p = 0.11$). Regarding the level of education, there is a slightly higher percentage of respondents with higher education (41.03%), followed by those with secondary education (32.05%) and the lowest percentage of respondents with primary education (26.92%).

2.2. Instrument: All participants were asked to complete the National Eye Institute 39-Question Visual Function Questionnaire (Mangione, 2000), a self-administered survey widely used to assess patients' vision-related functioning (NEI VFQ-39 or NEI VFQ-25 + additional items). It was designed to evaluate patients' perceptions of the effect of ocular disease on daily functioning and QOL. NEI VFQ-39 assesses patients' ability to perform a broader range of tasks and was designed for ophthalmologic patients in general. It consists of the following 12 subscales: general health, general vision, ocular pain, near activities, distance activities, social functioning, mental health, role difficulties, dependency, driving, color vision, and peripheral vision. Responses to each question on the VFQ-39 were converted to a 100-point scale, where 100 indicates the best possible score or minimal subjective impairment, and 0 signifies the worst or maximal subjective impairment. The questionnaire is legally accessible and can be freely downloaded and administered (free-access), providing keys for coding the responses and their interpretation.

2.3. Statistical Analysis: Descriptive statistics were obtained with the application of frequency, percentage, mean, and standard deviations (SDs). A chi-square test was used to test for differences in the proportion of participants between groups, and an analysis of variance (ANOVA) was used for the difference in the mean QOL between the groups, using statistical software package SPSS 25 (Statistical Package for the Social Sciences). Values of $p < 0.05$ were taken to be statistically significant differences.

Results

The mean scores for each subscale of the VFQ-39, analyzed separately for female and male participants, are presented in Table 1. For male participants, the lowest score was observed in the mental health subscale (49.97 ± 24.40), with the highest scores noted for color vision (86.49 ± 21.73). Similarly, female participants had the lowest score in the mental health subscale (53.55 ± 20.90), but they achieved the highest scores in the social functioning subscale (91.93 ± 13.67). Also, individuals with atypical optic neuritis exhibited the lowest scores for mental health (Jiang et al., 2022).

Table 1. Mean scores for each VFQ-39 subscales by gender

Subscales	Gender	N	Mean	SD	St. er. m.
General health	male	46	66.09	19.47	2.87
	female	32	70.86	15.47	2.73
General vision	male	46	78.15	17.14	2.53
	female	32	78.75	14.26	2.52
Ocular pain	male	46	66.30	19.52	2.88
	female	32	73.07	20.85	3.69
Near activities	male	46	69.38	20.29	2.99
	female	32	72.34	19.06	3.37
Distance activities	male	46	76.64	17.51	2.58
	female	32	83.76	16.74	2.96
Social functioning	male	46	86.41	14.87	2.19
	female	32	91.93	13.67	2.42
Mental health	male	46	49.97	24.40	3.60
	female	32	53.55	20.90	3.70
Role difficulties	male	46	61.55	23.50	3.46
	female	32	69.92	18.54	3.28
Dependency	male	46	66.44	34.29	5.06
	female	32	81.64	30.45	5.38
Driving	male	14	67.86	20.89	5.58
	female	28	75.30	14.16	2.68
Color vision	male	37	86.49	21.73	3.57
	female	29	89.66	23.64	4.39
Peripheral vision	male	45	77.78	18.63	2.78
	female	32	82.81	22.39	3.96

Table 2. Analysis of each subscale score between female and male participants

	Levene's Test		t-test for Equality of Means						
								95% Conf. Int.	
Subscales	F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	Lower	Upper
General health	3.233	.076	-1.155	76	.252	-4.772	4.131	-13.000	3.456
General vision	1.787	.185	-.162	76	.872	-.598	3.689	-7.945	6.749
Ocular pain	.262	.610	-1.459	76	.149	-6.743	4.620	-15.945	2.460
Near activities	.182	.671	-.649	76	.518	-2.958	4.557	-12.035	6.118
Distance activities	.051	.822	-1.799	76	.076	-7.123	3.959	-15.008	.761

Social functioning	.781	.379	-1.664	76	.100	-5.514	3.313	-12.113	1.084
Mental health	1.862	.176	-.675	76	.501	-3.582	5.303	-14.144	6.981
Role difficulties	4.834	.031	-1.683	76	.096	-8.372	4.975	-18.282	1.536
Dependecy	1.950	.167	-2.014	76	**.048***	-15.200	7.546	-30.229	-.1712
Driving	4.485	.040	-1.365	40	.180	-7.441	5.450	-18.455	3.573
Color vision	.084	.772	-.566	64	.574	-3.169	5.600	-14.358	8.020
Perifer vision	1.240	.269	-1.074	75	.286	-5.034	4.688	-14.374	4.304

Gender-based analysis of VFQ-39, as presented in Table 2, indicates that, in most aspects, differences between male and female respondents are not statistically significant. An exception was found in the subscale measuring dependence on help from others, showing a significant difference ($p<0.05$). Notably, in this sample, men with presbyopia perceived their quality of life as significantly lower in terms of independence in daily life.

Table 3. Mean scores for each VFQ-39 subscale by education

Subscales	Education	N	Mean	SD	St. er. m.
General health	primary	*21*	*57.98*	*19.90*	*4.34*
	secondary	*25*	*69.90*	*14.13*	*2.83*
	higher	*32*	*73.20*	*17.16*	*3.03*
General vision	primary	*21*	*73.57*	*19.44*	*4.24*
	secondary	*25*	*79.60*	*14.92*	*2.98*
	higher	*32*	*80.63*	*13.84*	*2.45*
Ocular pain	primary	*21*	*64.29*	*21.39*	*4.67*
	secondary	*25*	*67.00*	*17.63*	*3.53*
	higher	*32*	*73.83*	*20.91*	*3.70*
Near activities	primary	*21*	*62.82*	*24.77*	*5.40*
	secondary	*25*	*74.43*	*17.93*	*3.59*
	higher	*32*	*72.71*	*16.25*	*2.87*
Distance activities	primary	*21*	*68.27*	*20.31*	*4.43*
	secondary	*25*	*82.82*	*13.60*	*2.72*
	higher	*32*	*84.43*	*15.08*	*2.67*
Social functioning	primary	*21*	*81.35*	*16.17*	*3.53*
	secondary	*25*	*90.50*	*13.15*	*2.63*
	higher	*32*	*92.06*	*13.15*	*2.32*
Mental health	primary	*21*	*42.68*	*24.80*	*5.41*
	secondary	*25*	*56.60*	*21.20*	*4.24*
	higher	*32*	*53.16*	*22.09*	*3.90*
Role difficulties	primary	*21*	*55.06*	*22.24*	*4.85*
	secondary	*25*	*68.25*	*18.39*	*3.68*
	higher	*32*	*68.95*	*22.70*	*4.01*
Dependency	primary	*21*	*53.87*	*33.04*	*7.21*
	secondary	*25*	*80.00*	*31.09*	*6.22*
	higher	*32*	*79.30*	*31.53*	*5.57*
Driving	primary	*3*	*88.89*	*9.62*	*5.56*
	secondary	*23*	*75.96*	*10.78*	*2.99*
	higher	*4*	*69.39*	*18.78*	*3.68*
Color vision	primary	*21*	*85.71*	*23.44*	*6.26*

	secondary	*28*	*90.22*	*14.58*	*3.04*
	higher	*17*	*87.07*	*27.24*	*5.06*
Peripheral vision	primary	*20*	*72.62*	*26.11*	*5.70*
	secondary	*33*	*82.29*	*13.75*	*2.81*
	higher	*24*	*82.21*	*19.51*	*3.45*

Descriptive statistics of quality of life subscales based on the education level of presbyopic participants are presented in Table 3. Participants with secondary and higher education exhibited the highest scores in the social function subscale (90.50 ± 13.15; 92.06 ± 13.15). Interestingly, participants with primary school education achieved the highest score in the driving subscale (88.89 ± 9.62). Regardless of their education level, all presbyopic participants recorded the lowest scores in the mental health subscale.

Table 4. Analysis of subscale scores among groups divided by education level

ANOVA		***Sum of Squares***	***df***	***Mean Square***	***F***	***Sig.***
General health	*Between Groups*	*3066.425*	*2*	*1533.213*	*5.265*	***.007***
	Within Groups	*21841.668*	*75*	*291.222*		
	Total	*24908.093*	*77*			
General vision	*Between Groups*	*684.037*	*2*	*342.018*	*1.361*	*.263*
	Within Groups	*18840.643*	*75*	*251.209*		
	Total	*19524.679*	*77*			
Ocular pain	*Between Groups*	*1312.272*	*2*	*656.136*	*1.631*	*.203*
	Within Groups	*30164.090*	*75*	*402.188*		
	Total	*31476.362*	*77*			
Near activities	*Between Groups*	*1781.693*	*2*	*890.846*	*2.372*	*.100*
	Within Groups	*28172.203*	*75*	*375.629*		
	Total	*29953.896*	*77*			
Distance activities	*Between Groups*	*3697.719*	*2*	*1848.859*	*7.025*	***.002***
	Within Groups	*19737.364*	*75*	*263.165*		
	Total	*23435.082*	*77*			
Social functioning	*Between Groups*	*1576.668*	*2*	*788.334*	*4.011*	***.022****
	Within Groups	*14739.628*	*75*	*196.528*		
	Total	*16316.297*	*77*			
Mental health	*Between Groups*	*2372.771*	*2*	*1186.386*	*2.329*	*.104*
	Within Groups	*38208.719*	*75*	*509.450*		
	Total	*40581.490*	*77*			
Role difficulties	*Between Groups*	*2837.213*	*2*	*1418.606*	*3.131*	***.049****
	Within Groups	*33986.205*	*75*	*453.149*		
	Total	*36823.417*	*77*			
Dependency	*Between Groups*	*10171.507*	*2*	*5085.753*	*5.029*	***.009***

	Within Groups	*75852.632*	*75*	*1011.368*		
	Total	*86024.139*	*77*			
Driving	*Between Groups*	*1208.538*	*2*	*604.269*	*2.267*	*.117*
	Within Groups	*10396.152*	*39*	*266.568*		
	Total	*11604.689*	*41*			
Color vision	*Between Groups*	*210.398*	*2*	*105.199*	*.203*	*.817*
	Within Groups	*32592.632*	*63*	*517.343*		
	Total	*32803.030*	*65*			
Peripheral vision	*Between Groups*	*1521.916*	*2*	*760.958*	*1.891*	*.158*
	Within Groups	*29776.786*	*74*	*402.389*		
	Total	*31298.701*	*76*			

Using the ANOVA test (see Table 4), it was determined that the level of education of the respondents significantly affects their responses to five subscales: general health ($F=5.265$, $df=2$, $p<0.007$), distance activities ($F=7.025$, $df=2$, $p<0.002$), social functioning ($F=4.011$, $df=2$, $p<0.05$), role difficulties ($F=3.131$, $df=2$, $p<0.05$), and dependency ($F=5.029$, $df=2$, $p<0.009$). Additional, we conducted an analysis of potential contrasts between group means using the Scheffe post hoc test. In all 5 subscales where a statistically significant difference was observed, there was a consistent and significant difference between the group with primary education and the group with secondary/higher education ($p < 0.05$). In general, respondents with primary education had lower scores, indicating lower satisfaction with quality of life compared to those with secondary/higher education. Furthermore, a significant difference was observed on 2 subscales (remote activities and addiction), where respondents with primary education showed a significantly lower group score ($p < 0.05$) compared to those with secondary education. In addition, there was no statistically significant difference between the groups with secondary education and those with college/high education ($p > 0.05$).

Conclusions

Presbyopia, when not corrected, negatively affects both visual function and the quality of life of a person with presbyopia (Shervin et al., 2008). This condition not only leads to visual impairment but also affects their ability to perform various daily activities. In general, visually impaired individuals show lower total and subscale scores on the Visual Functioning Questionnaire (VFQ) compared to those without visual impairment.

The NEI VFQ-39 composite scores in persons with presbyopia were higher (73.66 ± 20.30; Tateshi et al., 2023) compared with atypical optic neuritis, age-related macular degeneration (Jiang et al. 2022), dry eye syndrome (Le et al., 2012), and glaucoma (Wu et al., 204).

According to Clemons et al. (2003), the mean total NEI-VFQ score did not differ significantly by gender. Furthermore, our study findings suggest that gender is not correlated with the quality of life in individuals with presbyopia. Interestingly, both women and men exhibited the lowest scores in the mental health subscale. These results emphasize that presbyopia not only affects visual acuity, but also reduces the quality of life and psychological well-being of patients. It emphasizes the importance of providing comprehensive support to these patients, not only for their physical health, but also for their quality of life and mental well-being.

Regarding the impact of individuals' education levels on quality of life (QOL), our findings are consistent with the existing literature. For example, Labiris et al. (2008) did not observe significant correlations between education and the total score and most subscale scores, except

for the general health and near-activity subscales, which showed mild to moderate positive correlations. In our study, participants with different levels of education showed significantly different scores on five subscales: general health, distance activities, social functioning, role difficulties, and dependence.

In conclusion, our research showed that the gender of presbyopic patients is not correlated with quality of life, while the level of education significantly affects different aspects of their quality of life.

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