

Predictors of health-related quality of life in Chinese patients receiving treatment for neovascular age-related macular degeneration: A Prospective Longitudinal study

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Research article

Keywords: age-related macular degeneration; health-related quality of life; predictor; longitudinal study

Posted Date: February 19th, 2020

DOI: <https://doi.org/10.21203/rs.2.23914/v1>

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Version of Record: A version of this preprint was published on July 16th, 2020. See the published version at <https://doi.org/10.1186/s12886-020-01561-3>.

Abstract

Objectives Age-related macular degeneration (AMD) is currently the leading cause of irreversible visual impairment in developed countries and seriously affect the health-related quality of life (HRQoL) of patients. However, the majority of the researches in this area employ cross-sectional design, and the longitudinal researches investigating changes in HRQoL and influence factors are limited. The aim of the study was to use longitudinal study design to investigate descriptive trends in HRQoL and predictive factors in Chinese AMD patients receiving treatment of vascular endothelial growth factor inhibitors (anti-VEGF) at baseline and follow-ups.

Methods A sample of 142 AMD patients from the outpatient clinic of the Southwest Eye Hospital, a tertiary major hospital in the southwest of China. Each patient completed a self-administered questionnaire assessing demographics, clinical features, HRQoL, depression, anxiety, coping style, social support and self-efficacy at baseline, 1, 3, 6 and 12 months' follow-up.

Results The total score of HRQoL was fluctuated with the highest score at 6 months follow-up and the lowest score at baseline. Multivariable linear regression showed the predictors of HRQoL are best-corrected visual acuity (BCVA), income, depression and visual acuity (VA) of the treated eye at baseline; BCVA, income and depression at 1 month follow-up; duration, area of residence, gender, VA of the treated eye, BCVA, income, anxiety, social support, self-efficacy, depression at 3 months follow-up; gender, BCVA, income, anxiety, social support, self-efficacy, depression, negative coping and positive coping at 6 months follow-up; BCVA, social support, self-efficacy and depression at 12 months follow-up.

Conclusions The HRQoL and its predictive factors in Chinese AMD patients receiving treatment of anti-VEGF were fluctuated over time. It is suggested that the medical staff should get more information when planning precise care for improving HRQoL of the patients.

Introduction

Age-related macular degeneration (AMD) is a condition which becomes the leading cause of irreversible vision loss and blindness among people older than 50, especially in developed countries[1]. Patients with the visual impairment caused by AMD often experience difficulties with daily life, cognitive dysfunction, social isolation, psychological and emotional disorders which seriously affect the quality of life [2–4]. Currently, the wet age-related macular degeneration (wAMD) is the only one form of AMD that can be treated by using the vascular endothelial growth factor inhibitors (anti-VEGF), which can be regarded to maintain the vision in more than 90% of patients and improve it in 25 ~ 40% of patients[5]. However, 65% of the patients were found to have no significant improvement in vision, and 50% patients were found to have different levels of mental and social disorders [6]. Furthermore, countless invasive intravitreal injections and frequent visits to the eye clinic made the patients feel pain, stressful and even fail to adhere to the treatment[7]. The controversy began whether the treatment benefit to vision could also improve the health related quality of life (HRQoL). Thus, the HRQoL and influence factors of patients with

wAMD is becoming a major concern in order to basically understand the patients' real feelings and provide the targeted treatment and service.

Recently, increasing number of studies have been carried out to assess the quality of life of patients with AMD, and significant improvements in HRQoL have been found after receiving the intravitreal treatment[8–11]. Factors identified to be commonly associated with HRQoL of AMD include female gender[12], best-corrected visual acuity (BCVA), contrast sensitivity, restricted activity days[13], visual acuity, stage of the disease[14] and the number of affected eyes[15]. Since HRQoL is changing over time, depending on the trajectory and treatment of disease, few researchers paid attention to dynamic changes of postoperative HRQoL. In this regard, Finger and Inoue demonstrated BCVA and HRQoL were significantly improved at the 6-month follow-up and remained stable at the 12-month follow-up, and a change in visual acuity of the treated eye directly influenced the patients HRQoL irrespective of whether the better or worse eye was treated[9, 16]. On the contrary, Wang found better visual function scores were associated with higher overall scores on the National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) after three months follow-up[11]. This change of HRQoL over time was also supported by a qualitative study which identified four major themes in living with the disease: cautious optimism, enduring, adaptation, and profound loss[7].

All the literatures mentioned above show the physical, mental and social functions of AMD patients vary with time since receiving the anti-VEGF treatment, and their care needs are constantly changing. However, the vast majority of the researches in this area employ cross-sectional design, and the longitudinal researches investigating changes in HRQoL and influence factors are limited. Although a few of studies have explored the longitudinal changes in the quality of life, the analysis of the influencing factors is only based on the demographic data and clinical variables of the patients, and little attention is paid to the psychosocial indicators of the patients such as depression, social support, self-efficacy, which had been found to have great impact on the HRQoL in our previous studies[17, 18]. Furthermore, there are no longitudinal studies about predictors for HRQoL of AMD patients receiving anti-VEGF treatment at different time points over a 12-month period. However, in precision medicine era, medical staff are required to accurately find the differences of the patients, predict the patients' needs at different stages, and provide personalized precise care based on different stages of prediction model[19–21]. Deeply understanding the positive and negative impact of the treatment, patients' experiences and patterns of adjustment over time for AMD patients receiving the anti-VEGF treatment is needed to established target service delivery and effective interventions that can improve the HRQoL.

The aim of the study was to use longitudinal study design to investigate descriptive trends in HRQoL and predict factors from the point of diagnosis of AMD and 1 year after receiving the anti-VEGF treatment. We will answer the questions as followed: Are there fluctuations in HRQoL after receiving the treatment over time? What are the variables that predict QOL at baseline and follow-ups?

Methods

Participants

Participants were obtained from the outpatient clinic of the Southwest Eye Hospital, a tertiary hospital in the southwest of China. The inclusion criteria for the wAMD patients were as follows: (1) age ≥ 18 years; (2) diagnosis of active exudative AMD and will have the intravitreal injection of anti-VEGF; (3) not taking any anti-anxiety or antidepressant medication; (4) no cognitive impairment.

Participants' data on name, sex, age, date of birth, marital, residential area, educational, monthly income and general health status were collected. The information about eye conditions were taken from ophthalmic records including visual acuity, stage of the disease and intraocular pressure at the beginning of the research. The visual acuity were tested by Snellen number charts and transformed into LogMAR visual acuity for the analysis.

Informed written consent was obtained by each participant before joining into the study. Our studies were conducted in accordance with the Declaration of Helsinki. Ethical approval was provided by the Human Ethics Committee of the First Affiliated Hospital of Third Military Medical University (Ethics Reference S13/05/109)

Study Design

Repeated measurement of longitudinal design was used in this study. The participants completed the questionnaires at baseline, 1-month, 3-month, 6-month, and 1-year follow-up between December 2015 and February 2018.

Instruments

National Eye Institute Visual Function Questionnaire (NEI-VFQ-25)

The NEI-VFQ-25[22] questionnaire was the product of an item-reduction analysis of the 51-item NEI-VFQ, and was developed to measure the dimensions of self-report vision-related health problems for persons with the eye diseases. It contains 25 items and generates twelve subscales: global vision rating, difficulty with near vision activities, difficulty with distance vision activities, limitations in social function, vision-specific role difficulties, dependency on others, driving problems, limitations with color vision and peripheral vision. The option for each item has possible scores of 0, 25, 50, 75, and 100, ranging from worst to best. The overall composite score for the NEI-VFQ-25 is an average of all the items.

Center for epidemiologic studies depression scale (CES-D)

The CES-D[23] is a 20-item self-rating measurement including 4 subscale: depressed affect, positive affect, somatic symptoms and retarded activity, and interpersonal difficulties. The higher the score indicates a higher degree of depression, score below 15 points is normal, score 16 ~ 19 is for possible depressive symptoms, and scores more than 20 points indicate the presence of depressive symptoms.

Hospital Anxiety and Depression Scale (HAD)

The HAD[24] was developed to identify cases (possible and probable) of anxiety disorders and depression among patients in non-psychiatric hospital clinics. It contains an Anxiety subscale (HADS-A) and a Depression subscale (HADS-D). The scores for each item are measured on Likert-type rating, and the score for each subscale is the sum of all the questions answered. The higher the indicated score get, the higher the level of anxiety or depression is.

Simplified coping style questionnaire (SCSQ)

The SCSQ[25] is a 20-item questionnaire to estimate the coping style of the people. Two dimensions of positive coping strategies and negative coping strategies were contained in the questionnaire, and each subscale has 10 items. Each item rated on the 4-point scale ranges from 0 ("rarely") to 3 ("always"). The higher score on the active coping strategies subscale is indicating better coping ability, whereas higher score on the negative coping strategies subscale is indicating worse coping ability.

Perceived Social Support Scale (PSSS)

The PSSS[26] consists of 12 items to estimate perceived social support from family, friends and significant others. Each item is scored on a 7-point rating scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). The overall score is the total score of all the items.

General Self-Efficacy Scale (GSES)

The GSES [27] is used to test the individuals' general perception of their abilities to cope with difficult situations. Ten items were contained in GSES with a 4-point Likert scale ranging from 1 (Not at all true) to 4 (Exactly true). The higher the score is, the higher the level of self-efficacy is.

Statistical Analysis

Data analysis was performed by the Statistical Package for the Social Sciences (SPSS, Version 20.0). The normal distribution of the data was examined by the Kolmogorov-Smirnov test. The characteristics of patients were generalized by mean and standard deviation for the normal distribution of continuous data, or median and Inter-Quartile Range for skewed distributed data, and frequencies and percentages were used for categorical data. The possible factors associated with HRQoL questionnaire were evaluated by the univariate analysis. For the normally distributed subscales, the t-test or Pearson's correlation coefficient were appropriately performed. On the contrary, for the non-normal distributed subscales, Wilcoxon signed-rank test or Spearman's rank correlation coefficient were appropriately implemented. The relationship between the variables and HRQoL was implemented by the Spearman's rank correlation coefficient. Multivariable linear regression analyses were conducted to control for the significant impact factors distinguished from the univariate analysis. The two-tailed P value < 0.05 was considered statistically significant.

Results

Demographics and Clinical Characteristics

As Table 1 shows, 142 patients with a mean age of 63.49 (SD, 11.07) years were recruited at baseline before their treatment; nearly half (48.59%) were male; the majority of participants (80.28%) were from urban areas compared with 19.72% of them were from rural areas; more than half (56.34%) had an income per month less than 10,000 RMB; and were married (69.01%); 40.85% of the participants had tertiary or higher education, and 23.24% had primary or lower education.

For the clinical characteristics, 68.31% had only right or left eye affected by exudative AMD. The mean visual acuity in the treated eye was 0.29 (SD=0.03), while the mean of best-corrected visual acuity was 0.51 (SD=0.12). A total of 137 patients were available for follow-up at 1 month; 131 patients were available for follow-up at 3 months; 128 patients were available for follow-up at 6 months, and 115 patients were available for follow-up at 1 year. Sixteen patients dropped out of the follow-up investigations because they continued the treatment elsewhere for convenience. They showed no difference in age, sex, education, marital status, area of residence, income or visual acuity at baseline from those followed up.

Changes in quality of life over time

The mean of the scores of overall scale and subscales at baseline and follow-ups were presented in Figure 1. Comparing with the scores at the baseline, statistically significant differences were found in the scores of three NEI VFQ-25 subscales including general vision, dependency and driving at 1 month follow-up after anti-VEGF treatment of AMD; the scores for six NEI VFQ-25 subscales in terms of general health, general vision, near activities, role difficulties, dependency and driving at 3 months follow-up; the scores for nine NEI VFQ-25 subscales regarding total score, general health, general vision, near activities, social functioning, role difficulties, driving, color vision and peripheral vision at 6 months follow-up; the scores for six NEI VFQ-25 subscales including general vision, distance activities, social functioning, role difficulties, dependency and driving at 12 months follow-up.

All the data were normally distributed, therefore the univariate analysis with t-test or Pearson's correlation coefficient was performed to find factors which could predict HRQoL (Table 2 and Table 3). At baseline, the categorical variables as marital status ($t=5.778$, $P=0.001$), area of residence ($t=2.90$, $P=0.004$), income ($t=8.06$, $P=0.001$) and eye affected by AMD ($t=3.095$, $P=0.002$) were found statistically significant between the t-test groups. The continuous variables as negative coping ($r=-0.259$, $P=0.01$), depression ($r=-0.270$, $P=0.01$), VA treated eye ($r=0.409$, $P=0.01$) and BCVA ($r=0.680$, $P=0.01$) were significantly correlated with the total score of NEI VFQ-25.

At one month follow-up, the categorical variables as gender ($t=2.092$, $P=0.038$), income ($t=6.811$, $P=0.001$), and eye affected by AMD ($t=3.260$, $P=0.001$) were found statistically significant between the t-test groups. The continuous variables as anxiety ($r=-0.537$, $P=0.01$), depression ($r=-0.533$, $P=0.01$), self-

efficacy ($r=0.272$, $P<0.01$), VA treated eye ($r=0.231$, $P<0.01$) and BCVA ($r=0.419$, $P<0.01$) were correlated significantly with the total score of NEI VFQ-25.

At three months follow-up, the categorical variables as gender ($t=2.884$, $P=0.005$), education ($t=7.337$, $P<0.001$), area of residence ($t=2.401$, $P=0.019$), income ($t=10.462$, $P<0.001$) and eye affected by AMD ($t=3.148$, $P=0.003$) were found statistically significant between the t-test groups. The continuous variables as anxiety ($r=-0.201$, $P<0.05$), depression ($r=-0.237$, $P<0.01$), social support ($r=0.285$, $P<0.01$), self-efficacy ($r=0.300$, $P<0.01$), VA treated eye ($r=0.586$, $P<0.01$) and BCVA ($r=0.550$, $P<0.01$) were correlated significantly with the total score of NEI VFQ-25.

At six months follow-up, the categorical variables as gender ($t=2.679$, $P=0.008$), and income ($t=3.796$, $P<0.001$) were found statistically significant between the t-test groups. The continuous variables as anxiety ($r=-0.363$, $P<0.01$), depression ($r=-0.798$, $P<0.01$), positive coping ($r=0.363$, $P<0.01$), negative coping ($r=0.328$, $P<0.01$), social support ($r=0.565$, $P<0.01$), self-efficacy ($r=0.336$, $P<0.01$) and BCVA ($r=0.412$, $P<0.01$) were correlated significantly with the total score of NEI VFQ-25.

At twelve months follow-up, the categorical variables as income ($t=2.866$, $P=0.005$) and eye affected by AMD ($t=2.195$, $P=0.03$) were found statistically significant between the t-test groups. The continuous variables as anxiety ($r=-0.341$, $P<0.01$), depression ($r=-0.656$, $P<0.01$), social support ($r=0.427$, $P<0.01$), self-efficacy ($r=0.616$, $P<0.01$), VA treated eye ($r=0.193$, $P<0.05$) and BCVA ($r=0.443$, $P<0.01$) were correlated significantly with the total score of NEI VFQ-25.

The total scores of NEI VFQ-25 as the dependent variable along with statistically psychosocial variables and covariates were entered into the linear regression analysis (Table 4). At baseline, four covariates (BCVA, income, depression and VA treated eye) retained significant predictors of NEI VFQ-25 total scores, and the coefficient of determination R^2 was 0.559. At one month follow-up, two covariates (BCVA, income) and one psychosocial variable (depression) retained significant predictors of NEI VFQ-25 total scores, and the coefficient of determination R^2 was 0.403. At three months follow-up, six covariates (education, area of residence, gender, VA treated eye, BCVA, income) and four psychosocial variables (anxiety, social support, self-efficacy, depression) retained significant predictors of NEI VFQ-25 total scores, and the coefficient of determination R^2 was 0.833. At six months follow-up, three covariates (gender, BCVA, income) and six psychosocial variables (anxiety, social support, self-efficacy, depression, negative coping, positive coping) retained significant predictors of NEI VFQ-25 total scores, and the coefficient of determination R^2 was 0.748. At twelve months follow-up, two covariates (BCVA, eye affected by AMD) and three psychosocial variables (social support, self-efficacy, depression) retained significant predictors of NEI VFQ-25 total scores, and the coefficient of determination R^2 was 0.509.

Discussion

By keeping track of the HRQoL in patients with wAMD receiving anti-VEGF treatment at baseline and follow-ups for one year, two significant findings were identified. First, the scores of NEI VFQ-25 overall scale and subscales were fluctuated before and after the wAMD patients receiving the treatment, with the highest scores at the 6 months follow-up and lowest scores at the baseline. Second, the variables that predict QoL varied across time, with BCVA and depression remaining as predictors across the five time points.

In our study, the total score and the subscales related to vision (eg. 'general vision', 'general health', 'near activities', 'distance activities', 'color vision' and 'peripheral vision') of NEI VFQ-25 had improved by following the course after receiving the treatment and reached the peak at 6 months follow-up. This may imply that the continuous improvement of the vision and wAMD patients' daily living abilities at the first 6 months, their HRQoL had also improved across the time. However, the total score of HRQoL was on average the same as at baseline, this finding was same with Finger's research[28]. Low number of injections and irregular follow-ups caused unstable improvement of vision, high expectation and disappointment on the treatment outcomes may lead the improvement of HRQoL could not be maintained at 12 months follow-up. Furthermore, because of fewer professional vision rehabilitation institutions and incomplete service network, the needs of patients for visual rehabilitation could not be met in China at present. Just as the developed country did, it is impossible to provide more comprehensive information support, supervision of regular follow-ups and professional visual function training for the discharged patients like it did in developed country[29]. On the meanwhile, the social functioning subscale was following the variation trend of subscales related to vision. The patients were more willing and confident to communicate with others and participate into the social activities after the vision have been improved. Otherwise, they preferred to staying at home and keeping them isolated from the outside. We can also find that the scores of the driving subscale was constantly declined from the baseline to follow-ups. This result may be explained by the fact that driving requires high level of vision, so most of the wAMD patients gave up driving regardless of whether the vision was improved or not after treatment. One interesting finding is that the scores of the subscales of role difficulties and dependency were the lowest at 3 and 6 months follow-ups although the vision had significantly improved. A possible explanation for this might be that most of the wAMD were elderly people, and in Chinese traditions, they were taken care by their spouses or children instead of professional institutes. The relatives played an important role in their vision rehabilitation. They can help the patients with daily activities, giving the comfort, and taking them to return visits which were the most frequent in the first six months, so the patients showed more dependency on their families[30]. On the other hand, increase of dependence would reduce the initiative and authority of the elderly at home, causing a strong sense of loss, which could lead to the difficulty of role adjustment.

The subsequent step aimed to figure out the variables that predict HRQoL at different time points. With the total score of NEI VFQ-25 as the dependent variable, the regression analysis was carried out with 17 variables including demographic data, medical condition and social psychological index as the independent variables. The results showed that the HRQoL in wAMD patients was influenced by many factors, which were also changed along with the process of treatment.

Demographics like 'gender', 'area of residence', 'education' and 'income' were identified to significantly influence the HRQoL. Male patients with high level of income and education, and living in urban areas showed better HRQoL. At the early and middle stages of treatment, the economic burden was one of the important factors that affect the quality of life. Due to Chinese health care system, the wAMD patients have to afford expensive anti-VEGF drugs at their own expense, which becomes a burden to the family. Therefore, the lower the income means heavier the economic burden, the poorer the quality of life. However, in the later stage of treatment, with the decrease in frequency of treatment, the patient's financial burden is reduced, the economic burden is no longer the main factor affecting the quality of life of patients at the 12 months follow-up. Also, area of residence and education played an important role in predicting HRQoL at 3 months follow-up. At the first three months of treatment, lack of knowledge of disease was an important factor affecting the quality of life, and patients with higher educational level were more inclined to effectively seek information support[31]. With the process of treatment, patients with lower educational level got more and more information about the disease, and the impact of education on the quality of life of patients weakened. On the other hand, gender was found to influence the HRQoL at the 3 months and 6 months follow-up. The total score of NEI VFQ-25 of female patients were lower than those of male patients. The reason for this may be the personality characteristics of the female patients are vulnerable and sensitive, and the negative emotions such as nervousness, depression and inferiority are more likely to occur than the male patients which resulting in poorer quality of life[32].

In addition to demographic variables, we also found the clinical characteristics like 'BCVA' and 'VA treated eye' were significantly factors in predicting the HRQoL. The improvement in BCVA were associated with improvement in HRQoL had been proved in many studies[33, 34]. The possible explanation was patients relied on BCVA with daily activities through the whole process of treatment, and could get better use of residual vision with the rehabilitation training[35]. Therefore, BCVA became the key impact factor to be the predictor across the five time points. On the other hand, patients paid much attention to the VA treated eye at the early and middle stage of treatment, then they adapt to the changes of visual function, and the visual acuity of treated eye was no longer an important factor of HRQoL at 12 month follow-up. Also, impact factor 'eye affected by AMD' was also found to influence the HRQoL at 12 month follow-up. NEI VFQ-25 Scores of bilateral patients were lower than those of unilateral patients [36]. This may be patients are mainly concerned about 'BCVA' and 'VA treated eye' in the early stage. However, with the vision is stable or decreased, the unilateral patients can still depend on the visual acuity of the other unaffected eye, while the bilateral patients are unable to adapt to their losing visual function in the later stage[32].

Consistent with other studies, we found higher depression and anxiety were significantly associated with poorer HRQoL[12, 37], and the depression was found to be the predictor of HRQoL across all the time points. The prevalence of depression in AMD was reported between 17.9%[38] and 43%[39]. Symptoms of AMD, including difficulty in daily activities, recognising others and joining into the housework, may directly lead to social isolation, depend on others, and role conflicts which would in turn result in an increase in depression and anxiety[2]. Also, because of the uncertainty of AMD treatment, they are constantly worried about whether the positive effects of treatment could be able to sustain or eventually leading to inevitable blindness though the whole treatment time [40]. Furthermore, the great economic

burden would aggravate the symptoms of depression and anxiety especially in the middle stage of treatment. However, some patients tried to make the coordination of daily life difficulties and emotional conflict, develop positive coping strategies, and take a positive optimistic attitude towards life during the longer duration of AMD. Therefore, the symptom of anxiety and depression eased in later stage.

Social support was also found to be significantly related to HRQoL at 3 months, 6 months and 12 months follow-ups. Social support was confirmed to help the patients to promote good mental state and face diseases caused by a variety of physical function, psychological and social difficulties, so as to improve the patients' compliance and quality of life[41]. For Chinese culture, the family was the main source of the social support during the long-term treatment and rehabilitation. They involved into the vision rehabilitation services which had a vital impact on the health outcomes of patients. Furthermore, the support as information, how to manage the symptoms and improve the ability of psychological adjustment and management strategy supplied by the medical staff was an important role in promoting the improvement of survival quality[42].

We also assessed the effect of self-efficacy and found it has a positive effect on quality of life at 1, 3 and 6 months follow-ups. Self-efficacy refers to that to what degree does a person think of his actions that would lead to a certain outcome, which means the expectation that an individual would successfully perform a behavior[43]. With the progress of treatment, patients with high level of self-efficacy regarded conflicts and difficulties as a chance to improve abilities and had great confidence in the success of the treatment. They imagined the success scenario and adopt positive health behaviors to promote effective cognitive reconstruction process. Conversely, a healthy and effective cognitive and behavioral experience could strengthen self-efficacy and beliefs, so the patients would show more active adaptability and strive to overcome the various symptoms caused by daily life, social and psychological barriers throughout the treatment and nursing process which could improve the HRQoL of the AMD[44].

Other psychosocial variables such as negative and positive coping were demonstrated to be the significant determinant of HRQoL at 6 months follow-up which was partly consistent with Sturrock's findings[45]. In their study, only avoidant coping not acceptance coping was observed to significantly determined decline in vision-related functioning. This may be because of inadequate professional vision rehabilitation organization to help the patients to develop positive coping ability in China. They had to form the special coping strategies gradually when dealing with the disease. Therefore positive or negative coping style will affect patients' subjective understanding, problem-solving ability and mental health. Also, different scales used to test the coping ability may lead the different outcomes.

As is the case with all studies, some limitations must be noted. Firstly, a relatively small and single sample size was recruited in our study, and the findings may not be generalized to all the AMD patients in China. Secondly, due to time constraints and dropout of the patients, we only did the 12 months follow-up. Advanced computer-based HRQOL instrument like eye-term bank should be adopted in the future studies to evaluate the predictors of HRQOL changes[46]. Finally, although we have tried our best to include all the impact factors which we assumed to be the predictors of HRQoL in AMD patients, some

other potential predictors may be missed which might be significantly related to HRQoL. Nevertheless, this study is the focus on HRQoL and predictors of disease trajectory in five time points, which could understand its dynamic changes more precisely and provide more accurate information for the clinical working. Also, not only the sociodemographics and clinical characteristics, but also the psychosocial indicators that influence HRQoL were brought into our predicting analysis which had been neglected or incomplete by other studies.

Conclusions

As hypothesized, the HRQoL of the Chinese AMD patients receiving the anti-VEGF treatment was fluctuated over time. The total score of NEI VFQ-25 had improved after getting the treatment reaching the highest point in 6 months follow-up, and decreased at 12 months follow-up. Also, not only the variables of demographics and clinical characteristics, but also psychosocial indicator had an effect on HRQoL, and the predictors for HRQoL varied at baseline and follow-ups. Understanding the changing rule of the predictors at different stages of treatment assists the medical staff getting more information to guide in planning targeted intervention and supportive care for improving HRQoL of AMD patients at different time of the treatment. At early stage of treatment, much attention should be paid to patients with low income and limited visual acuity. Psychosocial intervention and sufficient information support should be provided to so as to decrease the incidence of depression. At the middle stage of treatment, Special attention should be given to the various discomforts, anxiety and depression caused by the treatment, especially female patients from rural residents, with low level of education and income. Coping strategies and self-management should be taught and mastered to face the difficulties caused by the disease and increase the self-efficacy. Family members should also be encouraged to participate in presenting treatment procedure and rehabilitation. Finally, visual function training should be strengthened so as to maximize the use of residual vision if visual function cannot be improved or sustained at the later stage. In this way, the patients could get comprehensive, integrated and precise care at different times of treatment and improve their HRQoL in the long-term outcomes.

Declarations

Acknowledgements

The authors would like to thank all participants who take part and gave the valuable information in this study.

Contributors

WB, ZW and SL contributed to the design of the study; WB, JW, SL and YY were responsible for acquisition of data; WB, JW, ZW and SL were responsible for the analysis of the study and drafted the article; WB, ZW, YY and SL revised the manuscript. All authors read and approved the final manuscript.

Funding

This study was funded by the Chongqing Technology Innovation and Application Demonstration (Social and Livelihood General) Project (cstc2018jscx-msybX0129), Chongqing Social Science Planning Youth Project (2018QNSH42) and the Army Medical University of Humanities and Social Science project (2017XRW21)

Competing interests

None declared

Patient consent

Informed written consent was obtained by each participant before joining into the study. Our studies were conducted in accordance with the Declaration of Helsinki.

Ethics approval

Ethical approval was provided by the Human Ethics Committee of the First Affiliated Hospital of Third Military Medical University (Ethics Reference S13/05/109)

Provenance and peer review

Not commissioned; externally peer reviewed.

Data sharing statement

All data relevant to the study are included in the article, and there are no additional data available. Data is available on request to the corresponding author.

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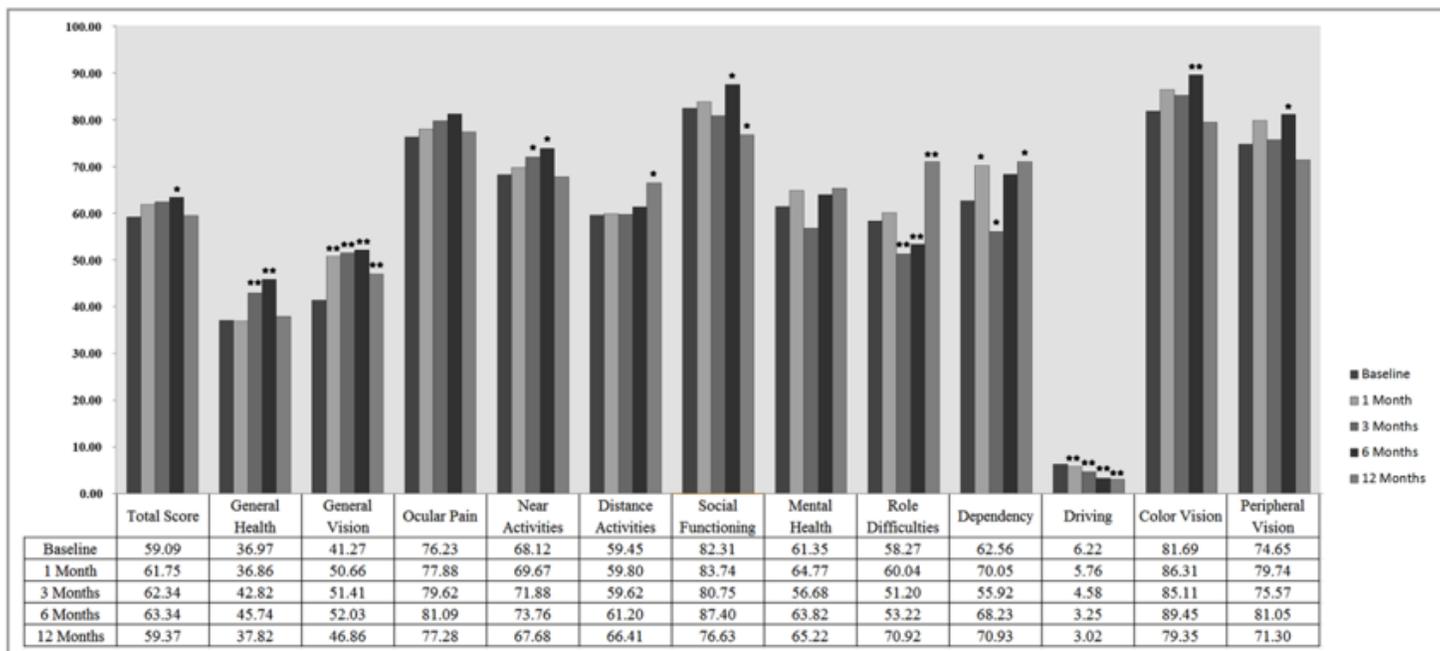
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Tables

Due to technical limitations, Tables 1 - 4 are only available for download from the Supplementary Files section.

Figures



Notes: *P<0.05. **P<0.01.

Figure 1

Comparisons of the scores of overall scale and subscales in NEI VFQ-25 at baseline and follow-ups

Supplementary Files

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- [Tableok.docx](#)