

## Acupuncture Therapy, a Hope for RP Patients

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Received date: May 18, 2018; Accepted date: June 18, 2018; Published date: June 25, 2018

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### Abstract

**Purpose:** To evaluate the RP patient's visual function changes after acupuncture therapy.

**Method:** This was a prospective, interventional case series study. Forty-three eyes of 23 RP subjects were evaluated. Each subject received 10 half-hour body acupuncture sessions. Considering the Para clinic tests, we explored in this study, including the placebo control group was not necessary. Tests we conducted in this study are included best corrected visual acuity (BCVA), uncorrected visual acuity (UCVA), near visual acuity (NVA) (Snellen chart), SITA standard static 30-2 perimetry (Humphry perimeter), and full-field ERG (Metrovision-Monopack system). Acupuncture procedures carried out at a private office. Statistical testing was carried out by using the SPSS-19. P-value  $\leq 0.05$  considered statistically significant. Sampling method was convenient sampling.

**Results:** Improvements of UCVA, BCVA and NVA after acupuncture therapy were statistically and clinically significant ( $p=0.048$ ,  $p=0.0005$ ,  $p=0.002$  respectively). The changes of Mean Foveal Threshold (MFT) and Mean Deviation (MD) were statistically significant ( $p=0.031$ ,  $p=0.02$ ). The scotopic b2 amplitude shown to have statistically significant changes ( $p=0.004$ ). Changes in the three scotopic b/a ratios and photopic b/a ratio were clinically significant. No statistically significant difference between different age group ( $0.175 \leq p \leq 0.808$ ) and the two sexes ( $0.295 \leq p \leq 0.767$ ) were indicated. Improvement of Subjective symptoms was indicated in most of the cases.

**Conclusion:** Acupuncture therapy can bring a hope for RP patients to improve their visual function.

**Keywords:** Acupuncture; RP; Retina

### Introduction

Retinitis pigmentosa (RP) represents the most common group of inherited, progressive degeneration of retina [1-8]. Currently, there is no definitive treatment for RP [4,9].

Acupuncture has a history of several thousand years in China and is now becoming recognized in western medicine [10]. In 1979, the WHO issued its first report on traditional medicine. According to the literatures, acupuncture has been used to treat a wide variety of eye diseases [11-13].

According to the basic science, clinical research and RP patient's self-reports, acupuncture may improve visual function [1,9,11,14-17]. The goal of this study was to determine whether RP visual functions can improve after acupuncture therapy.

### Method

This was a prospective, interventional case series study. Forty-three eyes of 23 RP subjects, involving 71.1% males and 28.9% females were evaluated. Each subject received 10 half-hour body acupuncture sessions every other day. The acupuncture prescription was a standardized protocol for RP patients. A placebo control group was not included in this research as according to the literatures, selection of a control intervention (inserting needles into non-acupoints or use of a

blunt tip sham needle) in acupuncture research remains controversial [9,12]. Also considering the Para clinic tests that we explored in this study, including the placebo control group was not necessary. Tests that we conducted in this study included best corrected visual acuity (BCVA), uncorrected visual acuity (UCVA), near visual acuity (NVA) which were carried out by Snellen chart at Labaffinejad eye specialty hospital, SITA standard static 30-2 perimetry (Humphry perimeter), which was carried out at Labaffinejad eye specialty hospital, and full-field ERG (Metrovision-Monopack system) which was carried out at Negah eye specialty hospital, and acupuncture procedures carried out at a private office.

The VA (UCVA, BCVA, NVA) was tested by Snellen chart in decimal and then converted to logMAR unit. Mean deviation (MD), pattern standard deviation (PSD), foveal threshold (FT), and mean foveal threshold (MFT) (the mean threshold of the four central points) were evaluated in perimeter test. The amplitude of "b" wave and the b/a ratios in three scotopic and one photopic response were evaluated in ERG test.

RP subjects with previous history of acupuncture for RP, and BCVA less than 0.1 (decimal) were excluded. Under the supervision of a specialist ophthalmologist any nutritional supplements (lutein, Vitamin A) that had been used prior to participation, were discontinued at least one month before the beginning of acupuncture sessions. To determine subjective changes in visual function, at the beginning of each post-treatment follow-up visit prior to any vision testing, an interview was conducted by four choices (never, a little, so-so, very) questionnaire.

The questionnaire evaluated the changes of near, distance, peripheral, central, night and light vision. To eliminate the psychological effects of the treatment, post tests were taken 7-10 days after last session of acupuncture. The protocol for the study was approved by the Shahid-Beheshti Medical Science's University research center with ethical code sbmu.rec.1392.445. The study was supported by rehabilitation faculty's research center of Shahid-Beheshti Medical Science University with grant number 90-1-93-8617.

In this study we used a routine acupuncture prescription from the several worldwide acupuncture prescriptions for RP. This acupuncture protocol consists of 10 thirty-minute sessions (every other day). The acupuncture points used in this prescription are: Stomach 2 (Si Bai), Yin Tang, Gall Bladder 20 (Feng Chi), Yu Yao, Gall Bladder 37 (Guang Ming), Small Intestine 6 (Yang Lao), Liver 3 (Tai Chong), Du 24 (Shen Ting), Large Intestine 11 (Qu Chi), Spleen 10 (Xue Hai), Bladder 18 (Ganshu), Bladder 23 (Shenshu) (Figure 1).

Each of these points has a specific functional mechanism. After explanation of the nature and possible consequences of the study, a written consent was obtained from each subject. Subjects paid no costs for acupuncture sessions or any of the tests. To avoid examiner error, all of the pre and post tests were carried out by the same optometrist and all acupuncture sessions were conducted by the same acupuncturist.

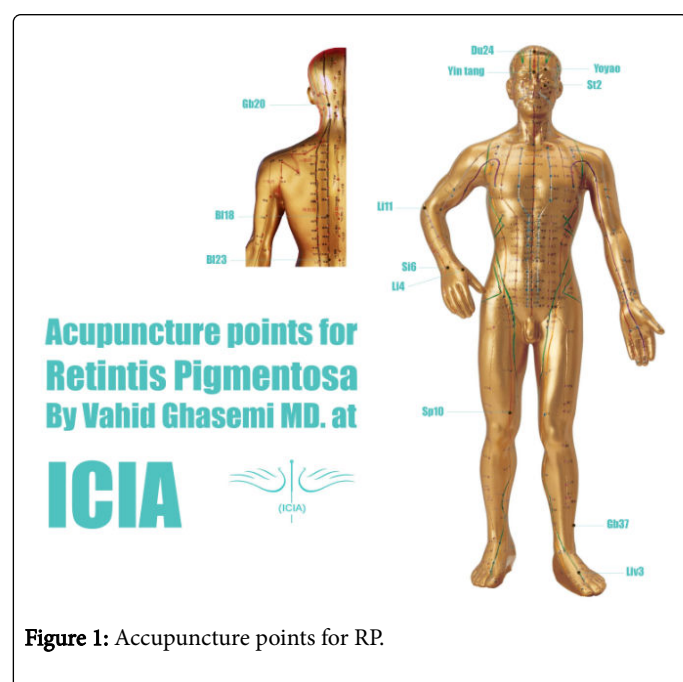


Figure 1: Acupuncture points for RP.

The following changes relative to baseline measures of visual parameters considered clinically significant: UCVA, BCVA or NVA (0.1 logMAR); FT and MFT ( $\geq 5$  db); MD or PSD in perimetry ( $>2$  db); b amplitude in ERG ( $>20$   $\mu$ V); and b/a ratio in ERG ( $\geq 0.2$ ).

Sampling method in this study was convenient sampling. Sample size was calculated by a pilot study and using the formula with ( $\alpha=0.05$ ,  $\beta=0.2$ ), with the scotopic b3/a3 ratio variable which gives us  $n=31$ .

Statistical testing was carried out by using the SPSS-19. All changes before and after the treatment for data with normal distribution were

explored by paired-sample T-Test, and the data without normal distribution were explored by Wilcoxon test. The normality of different age-group and the two sexes were verified by Shapiro-Wilk test. Then the difference of treatment effects between different age groups was explored by Kruskal-Wallis test, and between the two sexes was explored by Mann-Whitney test and independent T-test. P-value  $\leq 0.05$  considered statistically significant.

## Results

Twenty-three RP subjects were enrolled in this study. Twenty-one of them completed all the 10 acupuncture sessions, and the 2 other completed 7 sessions.

We evaluated 43 eyes of 23 cases in the age group of 15-53 years ( $36.29 \pm 10.3$ ), involving 71.1% (32 eyes) male and 28.9% (13 eyes) females. All of the subjects reported subjective improvements. Eleven subjects (47.82%) continued their acupuncture sessions in their own cost.

BCVA and UCVA were tested in all 43 eyes with Snellen chart and the results converted to logMAR unit. UCVA with mean before treatment  $1.046 \pm 0.51$  and mean after treatment  $0.980 \pm 0.52$ , was statistically ( $P=0.048$ ) and clinically significant. In BCVA test with mean before treatment  $0.630 \pm 0.44$ , and mean after treatment  $0.528 \pm 0.42$ , we have seen statistically ( $P=0.0005$ ) and clinically significant improvement.

In NVA 56.66% showed improvement and 10% worsened. Statistical evaluations show significant improvement ( $P=0.002$ ), with mean before treatment  $0.535 \pm 0.52$  and mean after treatment  $0.455 \pm 0.48$ , which was not clinically significant (Table 1). Difference between different age groups ( $0.175 \leq P \leq 0.808$ ) and the two sexes ( $0.295 \leq P \leq 0.640$ ) were not statistically significant.

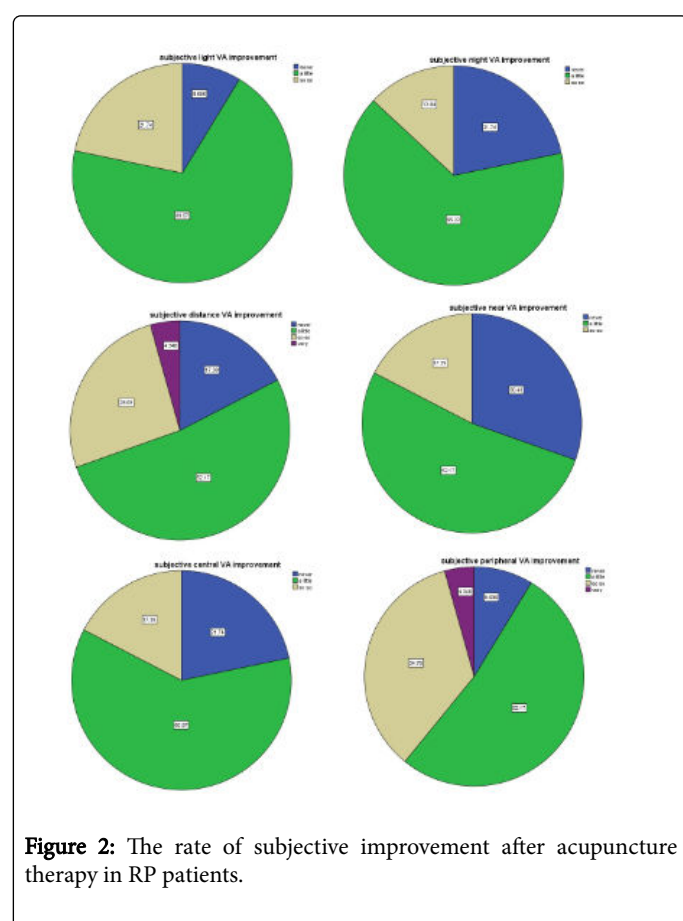
Perimetry test (SITA Standard 30-2) was carried out in all 43 eyes, in this test MFT with mean before treatment  $8.90 \pm 8.85$  and mean after treatment  $9.87 \pm 9.07$ , was although statistically ( $P=0.031$ ) significant but not clinically, MD with mean before treatment  $-30.31 \pm 3.85$  and mean after treatment  $-28.44 \pm 10.18$ , was statistically significant ( $P=0.02$ ), but not clinically (Table 1). Difference between different age groups ( $P=0.301$ ) and the two sexes ( $P=0.767$ ) were not statistically significant. There were no statistically or clinically significant changes in PSD and FT.

In full-field ERG testing three scotopic responses and one photopic response were evaluated in 34 eyes. The amplitude of b wave of the second scotopic response (scotopic b2 amplitude) in 25 eyes (73.52%) were worsen, and nine eyes (26.47%) were improved; With mean before treatment  $19.97 \pm 21.23$  and mean after treatment  $10.37 \pm 6.94$ , shown to have statistically ( $P=0.004$ ) but not clinically significant decrease (Table 1).

Of the other ERG variables, changes in the three scotopic b/a ratios and the photopic b/a ratio were clinically significant, although not significant statistically. The mean difference of scotopic b1/a1, scotopic b2/a2, scotopic b3/a3, and photopic b/a were respectively  $0.200 \pm 3.44$ ,  $-2.274 \pm 6.41$ ,  $1.09 \pm 2.62$ , and  $0.675 \pm 2.85$ , in which the scotopic b2/a2 ratio had clinically significant decrease (Table 1).

P-value	variance	Max Difference	Min Difference	Standard Deviation	Mean Difference	
0.048	0.044	1	-0.456	0.209	-0.065	UCVA* before and after acupuncture therapy
0.0005	0.23	0.09	-0.65	0.152	-0.102	BCVA † before and after acupuncture therapy
0.007	0.02	0.24	-0.35	0.132	-0.08	NVA ‡ before and after acupuncture therapy
0.031	74.95	56.64	-1.1	8.657	1.872	MFT § before and after acupuncture therapy
0.02	74.95	56.64	-1.1	8.657	1.872	MD    before and after acupuncture therapy
0.003	365.76	14.8	-70.8	19.124	-10.067	Scotopic b <sub>2</sub> amplitude before and after acupuncture therapy
0.757	11.9	8.8	-8.8	3.44	0.2	Scotopic b <sub>1</sub> /a <sub>1</sub> ratio before and after acupuncture therapy
0.057	41.15	8.3	-22.8	6.41	-2.274	Scotopic b <sub>2</sub> /a <sub>2</sub> ratio before and after acupuncture therapy
0.082	6.89	7.2	-2.8	2.62	1.09	Scotopic b <sub>3</sub> /a <sub>3</sub> ratio before and after acupuncture therapy
0.222	8.16	7	-5.6	2.85	0.675	Photopic b/a ratio before and after acupuncture therapy

**Table 1:** The distribution of Mean Difference, Standard Deviation, Minimum and Maximum Difference and P-Value of UCVA, BCVA, NVA, MFT, MD, Scotopic b<sub>2</sub> amplitude, scotopic b<sub>1</sub>/a<sub>1</sub>, scotopic b<sub>2</sub>/a<sub>2</sub>, scotopic b<sub>3</sub>/a<sub>3</sub>, and photopic b/a before and after acupuncture therapy.



Subjective changes were evaluated by a simple questionnaire which evaluated night, day, distance, near, central and peripheral VA improvements in four choices (never, a little, so-so, very) in all 23 cases. This questionnaire was evaluated binocular, as the cases cannot judge between their eyes separately. In night VA subjective

improvement evaluation, 78.2% of cases (18 of 23 cases) explained at least a little improvement, and 21.7% (five cases) explained no improvement. In light VA, 91.3% (21 cases) reported at least a little improvement, and 8.7% (two cases) reported no improvement subjectively. In NVA 69.6% (16 cases) reported at least a little improvement, and 30.4% (seven cases) reported no improvement. In distance VA 78.3% (19 cases) reported at least a little improvement, and 17.4% (four cases) reported no distance improvement. In central VA 78.3% (18 cases) reported at least a little improvement, and 27.9% (five cases) reported no improvement. In peripheral VA 87% of cases (21 cases) reported at least a little improvement, and 8.7% (two cases) reported no improvement (Figure 2).

## Discussion and Conclusion

In this study the effect of a routine prescription of acupuncture therapy in different aspect of RP visual functions were evaluated. Although according to literatures acupuncture may improve visual function, [9,11] but there was no same research has been carried out in Iran. In Iran this was the first research in this field. The results of this study indicated that as in previous studies, [13,15,18] central vision improvement were more than other aspects of visual function.

All of our subjects expressed subjective improvements after acupuncture sessions; which shows subjective satisfaction of this treatment for RP patients.

In this study we evaluated different ERG responses which have been in lower consideration in previous studies, we find statistically significant decrease in scotopic b<sub>2</sub> amplitude which was not clinically significant. The three scotopic b/a ratios and the photopic b/a ratio also were clinically significant although statistically were not significant. With larger group study there may be found more significant changes in ERG variables.

Western and Chinese medicine pointed two different directions for disease treatments. Western medicine searches the precise cause for a specific disease according to the symptoms, then setting up the treatment protocol [13]. The Chinese method believes that all parts of

the body are in relations with each other. It believes that a symptom can't have a specific cause, but it'll be looked as a part of a totality. It wants to know how the symptom fits into the patient's entire bodily pattern. Chinese medicine divided the human body into twelve definite and fixed channels pertaining to the organs of the body. The vital energy of 'Qi' flows through these channels [13]. This 'Qi' has two components known as 'YIN' and 'YANG'. Perfect health is achieving when 'YIN' and 'YANG' are in perfect harmony. Any imbalance between these two results in a disease state [13]. However, the mechanism of cerebral activation due to acupuncture in western medicine is not completely understood [19], recent studies demonstrated that acupuncture can activate specific brain area [19,20]. This might explain the therapeutic effects of acupuncture [19]. Acupuncture therapy can be called "Regenerative Acupuncture", which means that creation can be triggered again by the unlimited power of 'Qi'. And as a result, the reconstruction of a physically disabled or destroyed organ or tissue might be possible [21].

It has been shown that acupuncture can restrain the N-methyl-N-nitrosourea (MNU) induced apoptosis of photoreceptor cells [22]. It has been reported that following needling of vision-related acupoints in healthy human volunteers without RP, ophthalmic artery blood velocity is immediately increases or vascular resistance in the posterior ciliary arteries (PCAs) decreases [23], while such changes were not found following needling non-vision related acupoints.

According to the literatures any incurable retinal disease, respond favourably to acupuncture [13]. Acupuncture has a history of several thousand years in China and is now becoming recognized in western medicine.

Although our endeavour was to eliminate the related factors which may affect the treatment outcomes, our data hint the effect of some patient related factors that can influence visual function following acupuncture. Future research will need to identify the effect of systemic medications, lifestyle choices (diet, exercise), or RP genotypes on the results of acupuncture therapy. Maybe it is better to evaluate the sustained effect of acupuncture in long-term, continuing acupuncture sessions, and also evaluate the effect of different acupuncture prescriptions and different needle materials too.

In incurable diseases such as RP, finding a treatment to somehow improve their visual function, may bring a hope for them and increase their life expectancy. Acupuncture is an inexpensive and minimally invasive treatment modality.

One of our limitations in this study was findings volunteers, as most of these patients had not enough information about acupuncture therapy and its effects.

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