



Light emitting diode (LED) therapy to treat inflammation in postmenopause: in preliminary study

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Introduction

In geriatric gynecologic fields, inflammation is a common health problem in postmenopausal women. It can cause many symptoms as itching, dryness, pain, obesity, urinary symptoms etc. It makes to decrease the quality of life and to affect a negative effect on gynecologic symptoms. This study aims to evaluate the change of inflammation using Light emitting diode (LED) therapy in mice as a preclinical study.

Methods and Materials

We performed a prospective evaluation of 20 postmenopausal mice (Slc: ICR, Charles River Laboratories, Inc. (U.S.A) ; control group; n=10, LED group; n=10) which were undergone bilateral ovariectomy from July 2021 to September 2021. We used to the mixed wavelengths of three types as the 460-nm LED (blue), the 592-nm LED (amber), the 630-nm LED (red). Each mouse got LED device (Bellalux®, Linkoptics, Gwangu, Korea) on its buttock for 20 minutes for 2 weeks. We applied candida albicans (ATCC, 11006, University Boulevard Manassas, VA, 20110, USA) to mice's buttock and the blood sample in heart of mouse and analyzed to cell blood count (CBC), C-reactive protein (CRP) analysis. Our study was approved by the experimental animal institutional review board under registration number CKU-02-2021-004. Data were analyzed using SPSS software (version 22; IBM Corp., Armonk, NY, USA). Statistical significance was considered as P< 0.05). The paired t-test analysis was analyzed to compare between no LED group and LED therapy group for 2 weeks after LED treatment. (Figure 1)

Results

We compared to the result of blood test between no LED group (n=10) and LED therapy group (n=10) for 2 weeks after LED treatment. The mice of treatment group were treated on LED devices on its buttock for 20 minutes for 2 weeks. On blood analysis, mean whole blood cell (WBC) count of no therapy group was $4.37 \pm 1.03 \times 10^3$ cells/ μ L to be decreased to $3.12 \pm 0.76 \times 10^3$ cells/ μ L of the LED therapy group (p=0.007). The lymphocyte count was changed from $3.90 \pm 0.90 \times 10^3$ cells/ μ L to $2.73 \pm 0.68 \times 10^3$ cells/ μ L after LED therapy (p=0.004). There is no statistically significant change in CRP of both groups. (Table 1)

Figure 1. The mice were applied on buttock by LED.

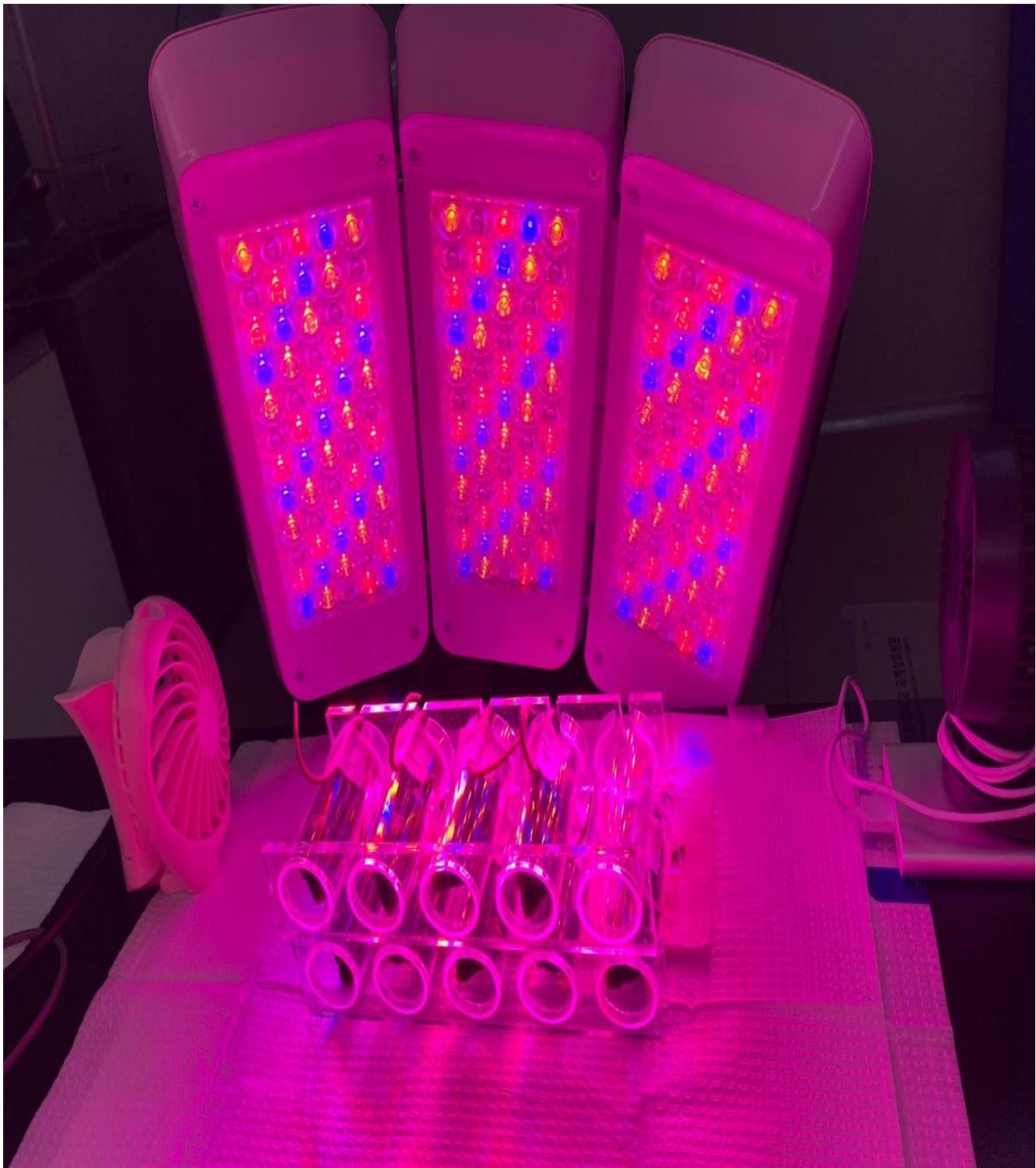


Table 1. The result of blood test between control versus LED groups

	Control	LED group	P value
RBC (*10 ⁶ cell/ μ L)	10.41 \pm 0.31	10.27 \pm 0.36	0.361
Hemoglobin (g/dL)	14.08 \pm 0.56	14.05 \pm 0.31	0.884
Hematocrit (%)	44.44 \pm 1.42	44.72 \pm 1.60	0.684
RBC indices			
MCV (fL)	42.69 \pm 0.41	43.56 \pm 1.56	0.106
MCH (pg)	13.53 \pm 0.18	13.70 \pm 0.33	0.171
MCHC (g/dl)	31.66 \pm 0.32	31.45 \pm 0.60	0.344
RDW (%)	18.97 \pm 0.49	19.27 \pm 1.46	0.547
MPV (fL)	6.55 \pm 0.11	6.58 \pm 0.09	0.512
Platelet (*10 ³ cell/ μ L)	1 210.90 \pm 137.62	1 217.0 \pm 157.65	0.928
WBC (*10 ³ cell/ μ L)	4.37 \pm 1.03	3.12 \pm 0.76	0.007*
WBC Differential counting (*10 ³ cell/ μ L)			
Neutrophil	0.36 \pm 0.03	0.30 \pm 0.07	0.322
Lymphocyte	3.90 \pm 0.90	2.73 \pm 0.68	0.004*
Monocyte	0.08 \pm 0.04	0.06 \pm 0.03	0.323
Eosinophil	0.04 \pm 0.02	0.02 \pm 0.01	0.094
Basophil	0.001 \pm 0.003	0.001 \pm 0.003	>0.99
WBC Differential counting (%)			
Neutrophil	8.13 \pm 2.48	9.91 \pm 1.71	0.078
Lymphocyte	89.37 \pm 3.12	87.49 \pm 1.66	0.111
Monocyte	1.64 \pm 0.70	1.88 \pm 0.63	0.430
Eosinophil	0.84 \pm 0.44	0.69 \pm 0.35	0.409
Basophil	0.02 \pm 0.06	0.03 \pm 0.09	0.785
CRP	0.22 \pm 0.04	0.19 \pm 0.04	0.273

Discussion

Candida albicans was common pathogen in vaginitis at postmenopause. It made vaginal itching, cheese-like discharge and skin eruption etc. We evaluated to LED treatment to improve the inflammation through the skin infection of candida albicans. The marker of inflammation in blood was checked. WBC and N/L ratio (neutrophil /Lymphocyte ratio) was evaluated. WBC and lymphocyte was decreased significantly after LED treatment. LED therapy was contribute to systemic infection through skin due to candida albicans in our study. We plan to the clinical study.

Conclusions

LED therapy improved to systemic inflammation in mouse model. It is expected that postmenopausal women would opt for adequate treatment option to restore in gynecologic symptoms related to inflammation. In the absence of clinical data on postmenopausal women, this provides evidence for a future approach.

References

1. Sertaconazole nitrate loaded nanovesicular systems for targeting skin fungal infection: In-vitro, ex-vivo and in-vivo evaluation. Int. J . Pharm. 527(2017)1-11