

• Research Article

Repeated cupping manipulation temporary decreases natural killer lymphocyte frequency, activity and cytotoxicity

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ABSTRACT

OBJECTIVE: Elevated natural killer lymphocyte cytotoxicity (NKc) has been linked with reproductive problems in women. Here we evaluate the potential benefit of cupping therapy (CT) in reproduction-related immune responses.

METHODS: This was a pilot clinical study. Participants were healthy female volunteers ($n = 23$) with elevated NKc, and received repeated CT 3 times over 5 d (inner pressure 40–50 kPa, 40 min; 12–15 cups). Lymphocyte subsets, NKc and NK lymphocyte activity (NKa) were measured in blood on day 0 (initial levels, before the first treatment) and days 3, 10 and 17 after the last CT treatment, using the K562-stimulated CD69 expression assay.

RESULTS: As a result of CT manipulations NKa was reduced on days 3 and 10, and NK percentage was reduced on day 10. NKc was most sensitive to CT treatment, resulting in their decreased counts at 3, 10 and 17 d post CT. CT treatment decreased NKc in the majority of individuals (87%), but the magnitude of the effect was variable. Out of 23 subjects 9 (39.1%) had a 2–3 fold decrease of NKc on days 3, 10 and 17; 11 (47.8%) started to show a decrease in NKc later, or more quickly returned to base levels; and only 3 (13%) subjects displayed no effect of CT on NKc. Expectedly, no changes in T-cell subsets (CD3CD4, CD3CD8, HLADR, CD158a) were observed after CT.

CONCLUSION: CT decreased NK cell numbers, their activity and cytotoxicity. Low cost, safety, non-invasive nature and ease of administration make CT a promising approach for NKc down-regulation.

Keywords: killer cells, natural; cytotoxicity; cupping therapy

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1 Introduction

In the Western world cupping has been widely used in medical practice for the treatment for pain syndromes^[1,2]. However, the precise mechanism of its action is currently

unclear. Cupping therapy (CT) results in a strong increase of lactate and an associated shift in the lactate/pyruvate ratio, indicating anaerobic metabolism in the surrounding tissues^[3]. Additionally, “cupping blood” had higher activity of myeloperoxidase, lower activity of superoxide

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dismutase, and higher levels of malondialdehyde and nitric oxide, compared to venous blood^[4]. Cupping also causes prolonged exposure of the skin to very reduced pressure, leading to the hyper-dilatation of blood vessels and local blood congestion causing intravascular stasis^[5]. It has also been shown that some variants of CT have modulatory effects on the innate and adaptive cellular immune responses^[6].

Nature killer (NK) lymphocytes play a key role in processes critical for human reproduction^[7,8]. NK-excited cytotoxicity is one manifestation of an imbalance in the general function of the NK system and is associated with reproductive problems in women, such as implantation and pregnancy failures^[9-12]. Thus, control of NK lymphocyte cytotoxicity (NKc) for therapeutic gain in the treatment of reproductive problems warrants a thorough investigation. This holds true since current methods, such as intravenous immunoglobulin or lipid infusion, lymphocyte immunization or intrauterine lymphocyte administration are still waiting to receive reliable evidential basis^[13-16].

The goal of this study is to identify how the peripheral blood cells are affected by CT treatment, and subsequently return to the general blood flow on the number, activity and cytotoxicity of NK lymphocytes. We hypothesize that: (1) Low pressure under the cups, for the duration of the treatment, stretches the skin, leading to the reshaping

of skin vessels and subsequently filling them with blood. (2) This blood persists at the treatment site for 3–5 d, affecting other blood cells through contact, close interactions and acidification, resulting in activation and apoptosis. (3) Affected blood lymphocytes return to the general blood flow without inflammation, tissue damage and/or thrombosis. (4) The immune system (especially NK cells) spends its reserve of resistance to eliminate the affected cells. (5) Repetition of this procedure several times wears out NK system by exhausting its excess reserves.

The objective in the experimental model has been the controlled temporary suppression of NKc using CT.

2 Methods and patients

2.1 Study design

We conducted a pilot study using 23 healthy, 18–25 years old, female volunteers, without chronic or actual infection and with previously confirmed elevated NKc. Cups were applied ($n=12$ cups) between days 5 and 20 of their cycle, three times (every other day) for 45 min (Figure 1). The pressure inside the cups was evaluated by visual inspection of the stretching of the skin, which occupied 25%–40% of the volume of cups (equivalent 40–50 kPa). The skin was treated with 30% glycerin solution prior to cupping in order to prevent damage

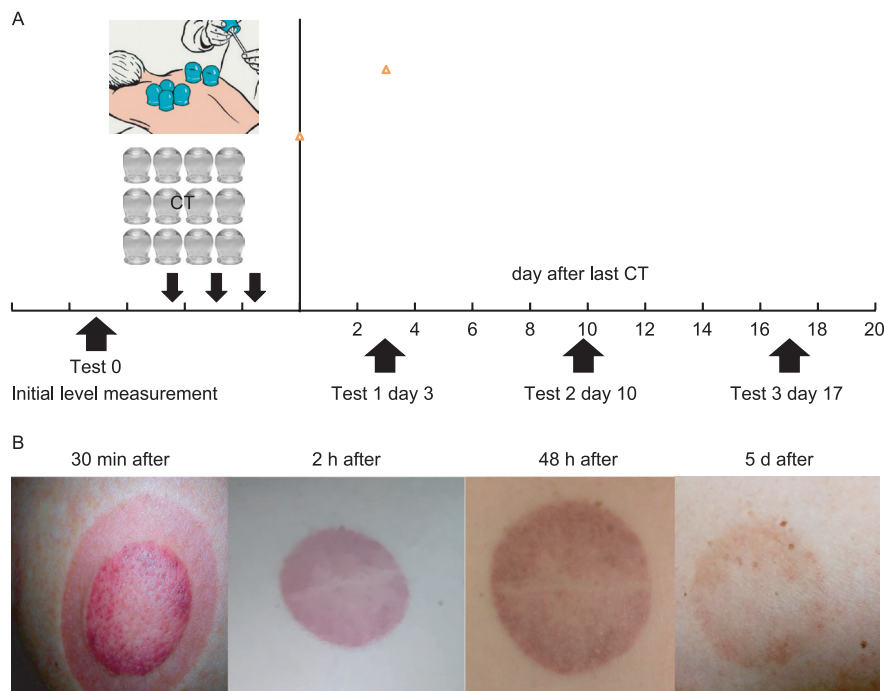


Figure 1 Flow diagram of the present study

A: Flow diagram of blood examination and cupping therapy manipulations; B: Form and color of intravascular stases unchanged 30 min, 2 h, 48 h and 5 d after cupping therapy. For control, in presented variant, we treated one (upper) side of cupping trace by heparin ointment immediately after manipulation. We did not find any difference in shape and resorption time between the two sides. It confirmed absence of capillary hemorrhage in proposed modification of manipulation. CT: cupping therapy.

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