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Research article

The impact of wet cupping on haematological and inflammatory parameters in a sample of Jordanian team players

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ABSTRACT

Background/objective: The practice of complementary and alternative medicine has significantly gained acceptance worldwide, such as Al-Hijama, also known as cupping therapy. Despite the growing popularity of therapeutic cupping among athletes, little is known about the impact of cupping therapy on sports fields. The current study was designed to explore the effect of wet cupping therapy on the haematological and inflammatory parameters in Jordanian national team players.

Methods: The procedure was carried out at a specialized centre for cupping in Amman on the morning of the 19th Rajab. The data were obtained from 14 healthy male participants aged between 21 and 22 years. The haematological and inflammatory parameters were assessed by comparing venous blood components before and after four weeks of wet cupping.

Results: Complete blood count (CBC) analysis of venous blood samples four weeks after wet cupping showed a significant increase in the values of total white blood cells (WBCs), neutrophils, lymphocytes, red blood cells (RBCs), haematocrit, and haemoglobin as compared with venous blood samples before cupping. Blood film examination of venous blood samples post-cupping revealed normocytic normochromic RBCs; WBCs and platelets were unremarkable. Analysis of inflammatory markers post cupping showed a significant decrease in the monocyte/lymphocyte ratio (MLR) and platelet/lymphocyte ratio (PLR) but no differences in neutrophil/lymphocyte ratio (NLR).

Conclusion: The findings of this study suggest that wet cupping has an indispensable influence on haematological and immunological parameters in athletes, where it reinforces cellular immunity, generates younger blood cells, and reduces inflammation markers. It is probable, therefore, that cupping improves sports performance and achievement. The evidence from this research adds to a growing body of literature on cupping therapy in sports.

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1. Introduction

One of the ancient therapeutic approaches was cupping (Al-Hijamah) treatment, which was used in various nations worldwide, such as Chinese and Egyptian therapeutic practices [1]. It remains a common form of traditional prophetic medicine in many Islamic nations. Referring to the Sunnah of the prophet, which is the second source of Islamic legislation, the prophet Mohammed (Peace and Blessing be Upon Him (PBUH)) said that Al-Hijamah is the best method for treating what you have (Sahih Bukhari and Muslim) [2]. Al-Hijamah therapy has no side effects if it is performed by a qualified individual at the right time. Wet cupping therapy is the most widely used form of treatment among the several cupping forms, including dry cupping [1]. While wet cupping incises the skin so that blood is pulled into the cup, the skin is drawn into the cup via dry cupping without being scarred [3–6]. It has been demonstrated that dry cupping has instantaneous impacts on variables like reduced muscle stiffness and enhanced blood flow, which may be associated with improved performance [7,8]. Thus, performance tasks can be undertaken shortly after dry cupping sessions. Conversely, it has been demonstrated that wet cupping has delayed impacts on variables such as the amount of arterial oxygen saturation [9]. It is noteworthy that it is not recommended to exercise right after wet cupping because of blood loss and skin incisions. Following the Islamic calendar, prophetic medicine states that only certain days that fall on the odd side (17th, 19th, and 21st) of the lunar months should be used for Al-Hijamah [2,10]. In recent years, a substantial body of literature on Al-Hijamah has emerged. It has been suggested that the primary effects of Al-Hijamah therapy are the improvement of blood circulation and the removal of metabolic waste products from the body [11]. Recent evidence suggests that Al-Hijamah therapy increases endogenous opioid production in the brain, which enhances pain management by inducing systemic comfort and relaxation [12]. Al-Hijamah is effective in treating various medical ailments, including headache, facial paralysis, asthma, musculoskeletal pain, cellulitis, skin diseases, fibrositis, cervical spondylosis, gouty arthritis, hyperlipidaemia, and immune system modulation [13–15]. Al-Hijamah therapy may also prevent the onset of cardiovascular diseases in hypertensive individuals by lowering systolic blood pressure [16]. It has the potential to reduce low-density lipoprotein (LDL) and total cholesterol levels, improving the prevention of atherosclerosis and cardiovascular diseases [17]. Furthermore, Al-Hijamah therapy reduces oxidative stress [18]. Many researchers have demonstrated that wet cupping leads to increased levels of erythrocytes, leukocytes, haematocrit, blood viscosity, uric acid, urea, glutamic oxaloacetic transaminase, iron, triglycerides, cholesterol, lead, mercury, aluminium, and silver in the blood obtained during the cupping procedure as compared to venous blood [18–20]. Furthermore, there is a consensus among multiple studies that total leukocyte count significantly increases in venous blood after cupping compared to venous blood before cupping [19,21,22]. In addition to the above, animal studies have shown that wet cupping raises RBCs and haematocrit levels [23]. Taken together, these studies indicate that Al-Hijamah therapy plays crucial roles in maintaining a healthy immune system, eradicating metabolic waste, and rejuvenating blood cells.

As cupping is frequently employed for therapeutic purposes, there is a growing demand for cupping, particularly during international sporting events. In addition to conventional medication treatments, cupping is also a subject of study in complementary medicine schools. Within the realm of sports, researchers have observed an increasing interest in therapeutic cupping, particularly among world champions. The 2016 Olympic Games in Rio De Janeiro, Brazil, serve as a compelling example, where many athletes, including Michael Phelps, a 23-time Olympic gold medals, prominently displayed red circular marks over their bodies, indicative of cupping therapy (Fig. 1A–B). The benefits of cupping for athletes include improved blood flow to the muscles, increased oxygen levels in the blood that nourishes the muscles, the removal of toxins and free radicals, and pain relief [24]. However, little is known about the impact of Al-Hijamah on athletic fields, and earlier research conclusions regarding cupping have exhibited controversy and inconsistency. Therefore, the present study was designed to determine the effect of wet cupping on the complete blood count (CBC) and prognostic haematological inflammatory markers by comparing venous blood before and after cupping in Jordanian national team players. The outcomes of this study aim to raise awareness regarding the potential benefits of utilising wet cupping, particularly within the realm of athletics.

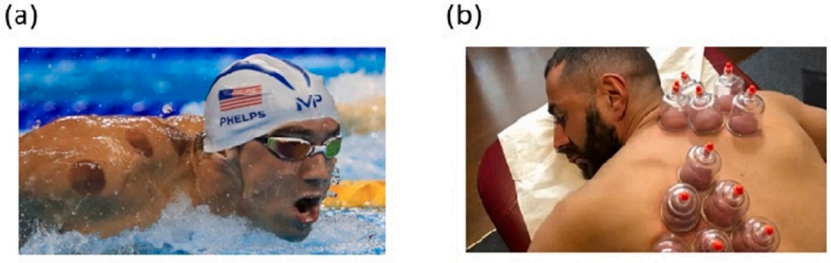

Fig. 1. Wet cupping therapy in world champions. Michael Phelps (A) and Karim Benzema (B) displayed red circles on their skin, indicating the use of cupping therapy. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.) Adapted from Musumeci et al., 2016 [36].

2. Materials and methods

2.1. Design and participants

This was an observational pre-post study performed at a specialized centre for cupping in Amman, Jordan, on the morning of the 19th Rajab, which is considered one of the preferred days for cupping [2]. The study included 14 healthy male volunteers, all of whom were Jordanian national team players in individual sports, including boxing (5), wrestling (5), and karate (4), and aged between 21 and 22 years. Before the cupping session, all participants showed normal body temperatures, heart rates, and blood pressure. They also confirmed having no history of acute or chronic diseases, such as coronary and pulmonary diseases, haematological diseases, infectious disorders, diabetes, nephropathies, neurological diseases, or autoimmune disorders. Participants who developed any infectious diseases during the study were excluded. The research ethical approval (Institutional Review Board (IRB)) was obtained from The Scientific Research Ethics Committee at the University of Jordan (Number: 39/2021/274) according to the Declaration of Helsinki. Written informed consent was obtained from all participants involved in the study.

2.2. Blood sample collection and laboratory analysis

Three millilitres (3 mL) of venous blood samples were collected from each fasting volunteer at two different times: at the baseline before wet cupping and four weeks after wet cupping. The blood was collected into anticoagulated tubes with Ethylenediaminetetraacetic acid (EDTA) to perform a complete blood count (CBC), including white blood cells (WBCs), white blood cell differential counts (WBCDC), red blood cells (RBCs), packed cell volume (PCV), haemoglobin (Hb), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), platelets (Plts), and mean platelet volume (MPV). These haematological parameters were automatically counted using the Beckman Coulter (Danaher Corporation) machine, in accordance with the standard manufacturer's guidance, at MEGALAB laboratories in Amman, Jordan. The wedge method was utilised for preparing blood smears, and Giemsa stain was used for staining blood smears. Prognostic haematological inflammatory parameters were calculated from the CBC parameters, including neutrophil/lymphocyte ratio (NLR), monocyte/lymphocyte ratio (MLR), and platelet/lymphocyte ratio (PLR).

2.3. Wet cupping procedure

All participants abstained from exercise and fasted overnight the day before the cupping procedure. A qualified researcher with expertise in cupping and a license to practice cupping performed the wet cupping procedure. Special tools (blades, cups, and blowers) were provided to each participant and were safely disposed of following the experiment. The location for cupping was determined according to the prophetic medicine, specifically on the upper back's surface (Fig. 2). The cupping area (the wither) was cleaned and rubbed with a 70 % alcohol solution. A sterile blade was used to make 5-7 mm-long parallel incisions through the cleansed skin along the backbone. Immediately, cups were applied, and blood began to seep within less than 5 min due to suction pressure.

2.4. Statistical analysis

Figures were generated using Prism 9.4 software (GraphPad Software, Inc). Statistical analysis was performed by paired two-tailed student's *t-test* to compare pre-and post-cupping blood samples using Prism 9.4 software, and significance levels were determined as follows: *, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$; and ****, $P < 0.0001$. Normality tests were performed using Anderson-Darling, Shapiro-Wilk, and D'Agostino & Pearson tests. Data are presented as mean ± standard error of the mean (SEM).

3. Results

All the study's participants were early adulthood males, aged between 21 and 22 years, to minimize biological discrepancies related to genders and ages. Table 1 shows the baseline characteristics of the participants before the cupping session. Complete blood counts (WBCs, WBCDC, RBCs, PCV, Hb, MCV, MCH, MCHC, Plts, and MPV), blood films, and derived prognostic haematological inflammatory

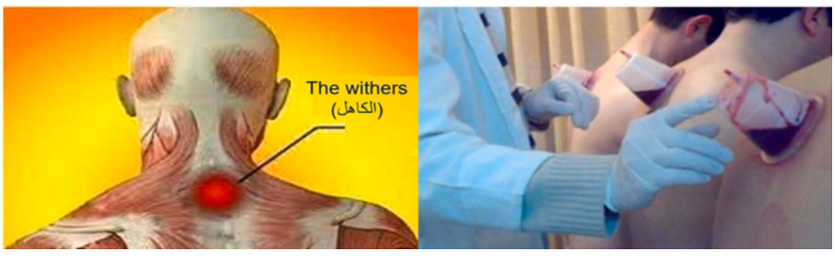

Fig. 2. The preferred area for cupping therapy. The withers region was used for cupping.
Adapted from Jahromi et al., 2016 [37].

parameters (NLR, MLR, and PLR) were performed for all participants to identify any differences between baseline (before cupping) venous blood values and those obtained four weeks post-cupping. Fig. 3 shows the experimental design for the analysis of venous blood samples before and after wet cupping.

3.1. Effect of cupping on white blood cells and differential counts

White blood cells (WBCs) are essential for the immune system's defence against infectious ailments. WBCs can be classified into two types: Polymorphonuclear cells (neutrophils, eosinophils, and basophils), also known as granulocytes, and mononuclear cells (lymphocytes and monocytes), also known as agranulocytes. Neutrophils and lymphocytes primarily contribute to the immune system's defence against bacterial and viral infections, respectively. In agreement with previous reports dealing with healthy people (Table 2), a significant increase in the total counts of WBCs ($p = 0.0005$) was observed in venous blood after four weeks of cupping in comparison to venous blood pre-cupping (Fig. 4A). Analysis of differential WBCs revealed that the numbers of neutrophils ($p=<0.0001$) and lymphocytes ($p = 0.005$) significantly increased in venous blood post-cupping when compared with pre-cupping samples (Fig. 4B–C). The increased counts of WBCs, neutrophils, and lymphocytes were still within acceptable reference ranges. In contrast, no differences in the numbers of monocytes, eosinophils, and basophils were noted in both groups (data not shown). Blood film examination of venous blood samples after cupping exhibited that WBCs were normal in numbers and shapes (data not shown). Overall, these results indicate that cupping therapy impacts leukopoiesis and boosts the immune system.

3.2. Wet cupping effects on platelets

Platelets, also known as thrombocytes, are responsible for the cessation of bleeding. Mean platelet volume (MPV) determines the volume of platelets. Further statistical tests revealed no significant differences in platelet counts and MPV between venous blood samples taken before and after cupping (Fig. 4D–E). The examination of blood film from venous blood samples after cupping exhibited normal platelet numbers and shapes (data not shown). These outcomes resemble those observed in earlier studies (Table 2), in which wet cupping has no impact on the platelet counts.

3.3. Effect of cupping on red blood cell counts and morphology

Haemoglobin (Hb) in red blood cells (RBCs) is responsible for transporting oxygen to cells and tissues. Packed cell volume (PCV), also known as haematocrit, measures the volume of packed RBCs in whole blood. Therefore, RBC counts and PCV are directly correlated with each other in healthy people. Further analysis showed that there was a significant increase in the count of RBCs ($p=<0.0001$) in venous blood post-cupping as opposed to venous blood pre-cupping (Fig. 5A). The values of haemoglobin and PCV were consistent with increased RBC counts, in which analysis showed significant increases in haemoglobin concentrations ($p = 0.0008$) and PCV values ($p = 0.0006$) in venous blood post-cupping when compared with venous blood pre-cupping (Fig. 5B–C). These values were still within acceptable reference ranges. On the other hand, RBC indices are calculated from RBC counts, haemoglobin, and PCV. RBC indices are mean corpuscular volume (MCV= PCV/RBCs), mean corpuscular haemoglobin (MCH=Hb/RBCs), and mean corpuscular haemoglobin concentration (MCHC= Hb/PCV). The RBC size is represented by the MCV, while MCH and MCHC reflect the RBCs' haemoglobin content. Comparing MCV, MCH, and MCHC in venous blood pre- and post-cupping revealed no statistical differences (Fig. 5D–F). Previous findings on the impact of wet cupping on RBC counts, PCV, haemoglobin, and RBC indices have been contradictory (Table 2). These discrepancies could be attributed to differences in cupping methodology, the number of cupping sessions, participant ages and genders, the health status of participants, and the duration of assessing haematological parameters post-cupping. Moreover, blood film examination of venous blood post-cupping showed the presence of normocytic (normal size) and normochromic (normal colour) RBCs (data not shown). In summary, these data suggest that cupping therapy activates erythropoiesis and enhances haemoglobin synthesis.

Table 1
Baseline characteristics of the participants before the cupping session.

Mean age, years (± SD)	21.5 ± 0.30
Gender, n (%)	Males, 14 (100)
Mean height, meters (± SD)	1.82 ± 0.05
Mean body mass, kilograms (± SD)	76 ± 3.40
Mean body mass index, kg/m^2 (± SD)	22.94 ± 1.20
Mean blood pressure, mmHg (± SD)	119/81 ± 7.0
Mean heart rate, bpm (± SD)	60.3 ± 4.50
Mean body temperature, Celsius (± SD)	37 ± 0.50
Types of sports (n)	Individual sports (14) - Boxing (5) - Wrestling (5) - Karate (4)
Training units (per week)	4–6
Training experience (years)	4–5

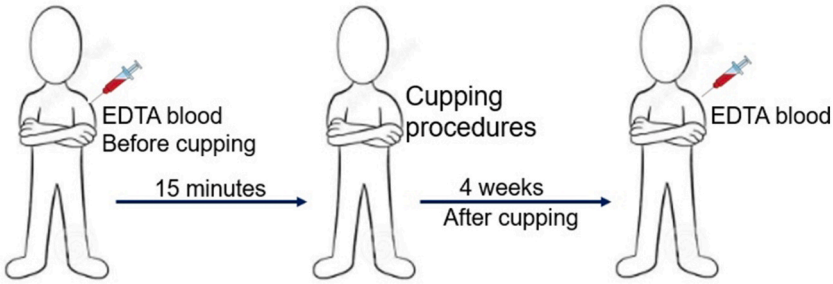

Fig. 3. Schematic representation of the experiment. Peripheral venous blood was collected before wet cupping and four weeks after cupping in anticoagulated tubes containing Ethylenediaminetetraacetic acid (EDTA).

Table 2
Published data about venous complete blood count before and after wet cupping in healthy people.

	DBT	WBCs	Neut	Lym	RBCs	Hb	PCV	MCV	MCH	MCHC	Plts
Al-Kazazz et al. [19]	2 wks	IH	ND	ND	NA	DC	NA	NA	NA	NA	NA
Asmalinda et al. [21]	8 h	IN	IN	IH	NA	NA	NA	NA	NA	NA	NA
Jahromi et al. [37]	7 days	IH	NA	NA	ND	ND	ND	NA	NA	NA	NA
Mahdavi et al. [38]	2 wks	IH	ND	ND	DC	DC	DC	ND	ND	ND	ND
Khalil et al. [39]	4 wks	IN	NA	NA	NA	ND	ND	NA	NA	NA	NA
Soleimani et al. [40]	4 wks	IN	NA	NA	ND	DC	ND	ND	IN	IN	ND
Alshareef et al. [41]	2 wks	IH	NA	NA	IH	IN	IH	IN	IN	IN	ND
Current study	4 wks	IN	IN	IN	IN	IN	IN	ND	ND	ND	ND

Abbreviations: DBT indicates the duration between two times (baseline and post-cupping); ND, no differences; IN, increase; DC, decrease; IH, insignificantly higher; NA, not assessed; Neut, neutrophils; Lym, lymphocytes; Hb, haemoglobin; and Plts, platelets.

3.4. Effect of cupping on prognostic haematological inflammatory parameters

Recently, prognostic haematological inflammatory parameters, including the neutrophil/lymphocyte ratio (NLR), monocyte/lymphocyte ratio (MLR), and platelet/lymphocyte ratio (PLR), have been widely described [25–27]. These parameters are easily measured from CBC indices and provide prognostic values for systemic inflammation [25–27]. However, no previous study has investigated the impact of cupping on these inflammatory parameters. There was a significant decrease in MLR and PLR values in venous blood post-cupping as compared to venous blood pre-cupping, whereas the NLR values were comparable in both groups (Fig. 6A–C). These data indicate that cupping therapy may reduce systemic inflammation.

4. Discussion

There are contradictory findings about the impact of cupping on healthy or sick individuals. The present findings provide crucial insights into the indispensable impact of wet cupping on haematological and immunological parameters in athletes. Herein, we show that post-cupping therapy resulted in an increase in levels of total WBCs, neutrophils, lymphocytes, RBCs, PCV, and haemoglobin, but a decrease in prognostic haematological inflammatory markers (MLR and PLR). Mechanical and biological effects of cupping therapy have been proposed by many theories, including “pain-gate theory”, “nitric oxide theory”, “activation of immune system theory”, and “blood detoxification theory” [10]. Fig. 7 explains the pathophysiology of cupping therapy effects and draws a connotation between these theories and the current findings.

It is well known that wet cupping can strengthen the immune system [19,21,22]. The significantly increased WBCs, neutrophil, and lymphocyte counts are still within acceptable reference ranges, indicating that skin infections are not adverse effects of wet cupping. Given that Al-Hijamah acts as an immunomodulatory regulator [14,22], the current findings further support the use of wet cupping therapy in treating herpes zoster, a viral infection, and cellulitis, a bacterial skin infection. In addition, physical exercises reinforce cellular immunity, but sustained high-intensity exercises can suppress the immune system. The boosted immune system eradicates pathogenic factors, reduces muscle–joint inflammation, and improves pain symptoms [28]. Along with the increased WBC counts observed in venous blood post-cupping, the current findings suggest that wet cupping may ameliorate the physical performance of athletes during sports activity.

It has been suggested that Al-Hijamah therapy can stimulate immune cells, enhance the circulation of blood and lymphatic cells, relieve pain symptoms, remove the body’s waste and toxins, aid in endothelial cell repair, and induce muscle relaxation [12–15]. Since the quantity and functionality of RBCs and haemoglobin determine how much oxygen is delivered to tissues [29], the results of this study demonstrate that RBC counts and haemoglobin concentrations are significantly impacted by wet cupping. Although one of the primary arguments against cupping is anaemia, our findings, alongside previous research that showed adequate RBC numbers (Table 2), signify that Al-Hijamah is a safe procedure and does not cause anaemia. Additionally, RBCs promote vasodilation and blood

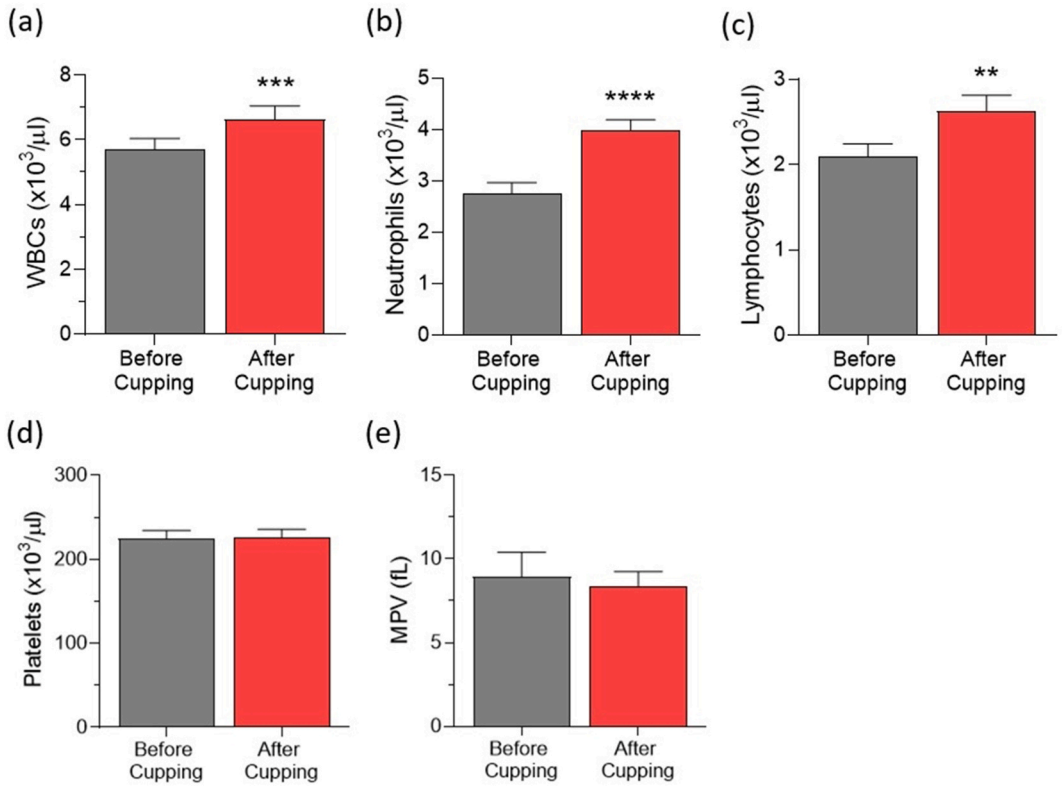

Fig. 4. Post-cupping therapy results in increased counts of venous blood WBC compared to pre-cupping levels. Enumeration of WBCs (A), neutrophils (B), lymphocytes (C), platelets (D), and MPV (E) in peripheral venous blood at the baseline before wet cupping and four weeks post-cupping. n = 14 for each group. Reference ranges: WBCs, 3.5–11 × 10^3/µL; neutrophils, 1.7–7.5 × 10^3/µL; lymphocytes, 1.0–3.2 × 10^3/µL; platelets, 150–450 × 10^3/µL; and MPV, 7–12 fL. Statistical analysis: Paired two-tailed student's *t-test*. Data are presented as mean ± SEM. *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$, ****$P < 0.0001$.

flow in working muscles by releasing nitric oxide (NO) molecules [30]. Perturbed peripheral tissue oxygenation due to decreased RBCs leads to the build-up of some metabolites such as lactate, which causes muscle fatigue, especially during high-intensity exercises. Intensive exercises can also cause intravascular haemolysis of RBCs, where the mechanical destruction of RBCs occurs in the circulation as they pass through capillary blood vessels in contracting muscles [29]. Thus, decreased RBCs are associated with disturbed tissue oxygenation, decreased NO levels, and accumulated metabolites such as lactate. Together with increased RBC counts and haemoglobin concentrations observed in venous blood post-cupping, the present study suggests that wet cupping enhances the generation of younger RBCs that improve tissue oxygenation in athletes.

Additionally, it has been proposed that cupping may play a role in reducing inflammation. The treated areas of blood vessels by cupping can stimulate the release of NO from endothelial cells, reducing inflammation by enhancing blood flow to body tissues. Previous findings implied that cupping therapy is associated with decreased secretion of proinflammatory markers such as interleukin-6 (IL-6) and tumour necrosis factor-α (TNF-α) [31,32]. The neutrophil/lymphocyte ratio (NLR), monocyte/lymphocyte ratio (MLR), and platelet/lymphocyte ratio (PLR) have been recently suggested as diagnostic and prognostic factors for systemic inflammation [25–27]. NLR is an inflammatory marker and measures the ratio between neutrophil counts (associated with innate immunity) and lymphocyte counts (linked to adaptive immunity) in peripheral blood. High levels of NLR are associated with inflammatory disorders, bacteraemia, COVID-19, coronary heart diseases, ischemic stroke, and higher mortality rates in the general population [26,33]. High MLR levels are indicative of a poor prognosis in patients with inflammatory disorders, lung and gastrointestinal malignancies, haematological malignancies, and decreased survival rates [34,35]. Increased levels of PLR indicate high platelet counts, highly activated platelets, and low lymphocyte counts. The proinflammatory cytokine IL-6 can increase peripheral platelet counts and reduce peripheral lymphocyte counts [26,35]. Elevated PLR levels are associated with a poor prognosis in patients with inflammatory disorders, coronary heart diseases, thrombogenic disorders, and reduced survival rates [26,35]. Consistent with previous studies that showed a reduction in proinflammatory markers (IL-6 and TNF-α), our findings displayed that cupping therapy resulted in decreased levels of MLR and PLR parameters. Previous reports have shown that exercises can increase the inflammatory marker IL-6, depending on the exercise intensity, the person's capacity for endurance, and the duration of exercise [32]. Together, the present findings provide additional evidence supporting the correlation between the beneficial effects of cupping therapy and the reduction of inflammation in athletes.

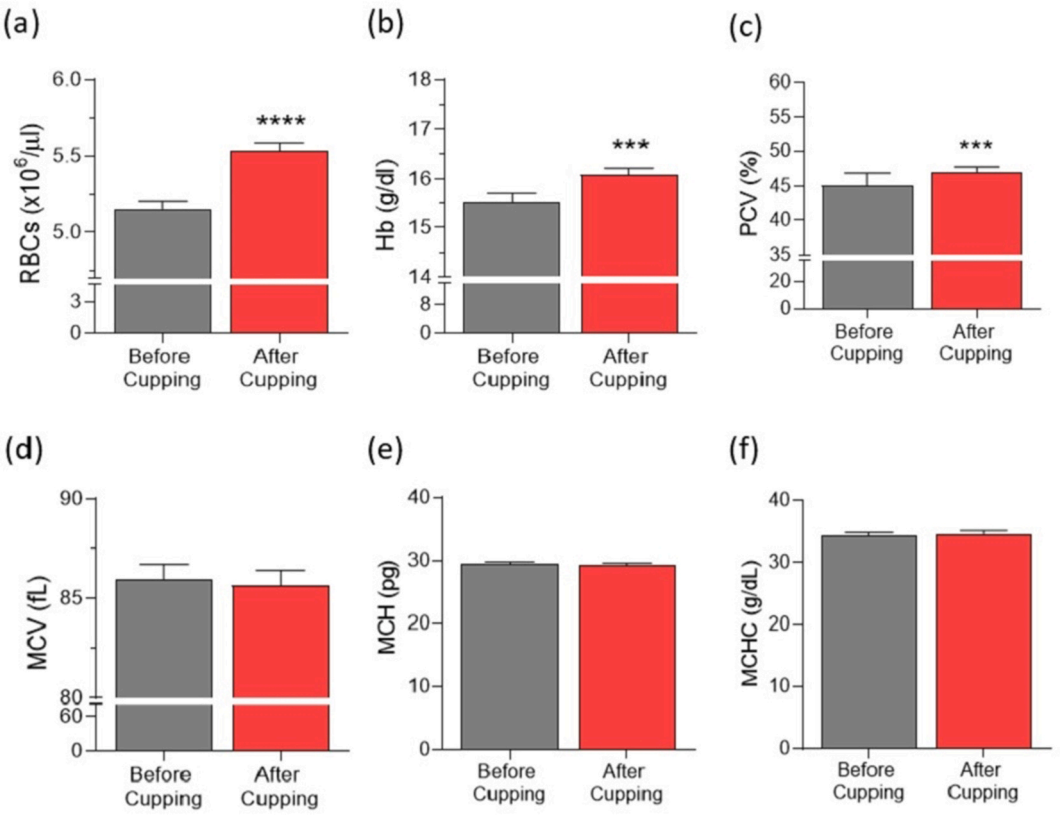

Fig. 5. Post-cupping therapy results in increased counts of venous blood RBCs and haemoglobin levels compared to pre-cupping levels. Values of RBCs (A), haemoglobin (B), PCV (C), MCV (D), MCH (E), and MCHC (F) in peripheral venous blood at the baseline before wet cupping and four weeks post-cupping. n = 14 for each group. Reference ranges: RBCs, 4.2–6.0 × 10^6/µL; haemoglobin, 13.5–18.0 g/dL; PCV, 40–54 %; MCV, 80–100 fL; MCH, 26–32 pg; and MCHC, 32–36 g/dL. Statistical analysis: Paired two-tailed student's *t-test*. Presented data are mean ± SEM. *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$, ****$P < 0.0001$.

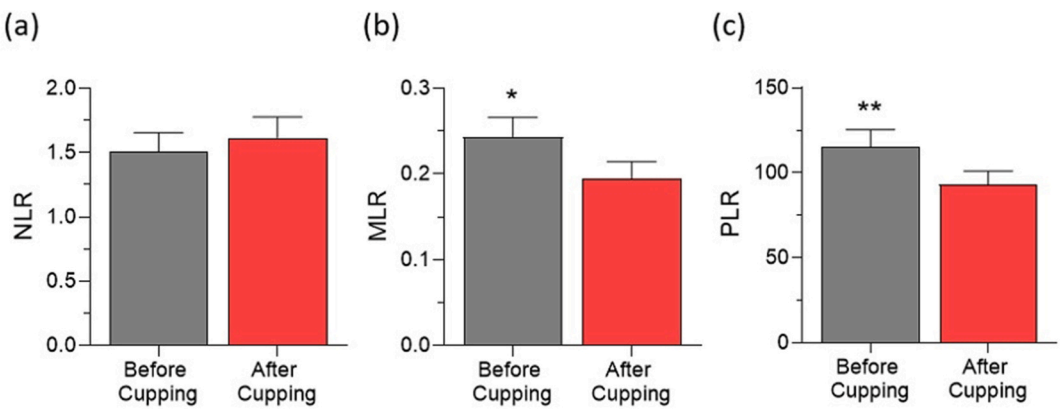

Fig. 6. Post-cupping therapy results in decreased values of prognostic haematological inflammatory parameters compared to pre-cupping levels. Values of NLR (A), MLR (B), and PLR (C) in peripheral venous blood at the baseline before wet cupping and four weeks post-cupping. n = 14 for each group. Haematological inflammatory parameters were calculated from complete blood counts, with NLR indicating neutrophil/lymphocyte ratio; MLR, monocyte/lymphocyte ratio; and PLR, platelet/lymphocyte ratio. Statistical analysis: Paired two-tailed student's *t-test*. Presented data are mean ± SEM. *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$, ****$P < 0.0001$.

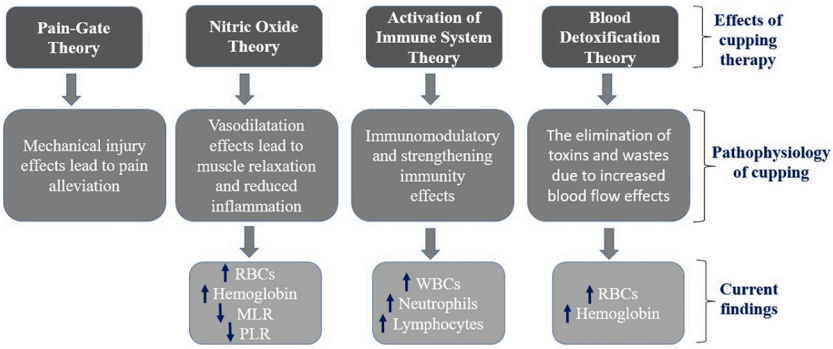

Fig. 7. Current findings related to the mechanism theories of cupping therapy effects. WBCs indicate white blood cells; RBCs, red blood cells; MLR, monocyte/lymphocyte ratio; and PLR, platelet/lymphocyte ratio. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)
Adapted from Al-Bedah et al., 2019 [10].

5. Limitations and implications for future research

While this study yielded encouraging results about the positive effects of wet cupping on various variables, as well as the growing interest from international athletes, there are certain limitations and areas that warrant further research. These are: (1) understanding the duration of the positive effects of cupping on the study variables and whether they are sustainable over time; (2) investigating the specific relationship between the observed positive effects of cupping and their direct impact on athletic achievement; (3) assessing the extent to which the effects of cupping can be generalised to athletes in a wider array of sports; and (4) recognising the need to consider different cupping techniques and cupping site locations and making comparisons to obtain the best results for athletes.

6. Conclusion

Despite significant advances in modern medicine, several studies have verified the effectiveness of complementary and alternative medicine, such as Al-Hijamah. There is insufficient information about the impact of cupping therapy on sports fields despite the increasing prevalence of therapeutic cupping among athletes. This study has shown that wet cupping has a crucial impact on haematological and immunological parameters in athletes, such as total WBCs, neutrophils, lymphocytes, RBCs, haemoglobin, MLR, and PLR. These findings may help elucidate the relatively good correlation between cupping therapy and haematological parameters involved in reducing inflammation, further contributing to the expanding body of literature on cupping therapy in the context of sports. Consequently, it is probable that cupping therapy could alleviate the inflammatory reaction due to exercises, thereby improving sports performance and achievement.

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Data availability statement

Data will be made available on request from the corresponding author.

CRediT authorship contribution statement

Ali Abdelfattah: Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Investigation, Formal analysis, Conceptualization. **Ayed Zureigat:** Writing – review & editing, Visualization, Methodology, Investigation, Conceptualization. **Alhomidi Almotiri:** Writing – review & editing, Visualization, Software. **Mohannad Alzughailat:** Writing – review & editing, Visualization, Validation. **Mutaz Jamal Al-Khreisat:** Writing – review & editing, Visualization, Software. **Osama Abdel Fattah:** Writing – review & editing, Visualization, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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