Original Article :

Wet cupping (Hijama) positively and significantly impacted multiple hematological parameters

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Received on 20- 8-2020 accepted for publication on 28-12- 2020 dx.doi.org/10.5455/mjhs.2021.02.011

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Abstract

Background and Aim:

Wet cupping, known as Hijama, is considered one of the main types of traditional (alternative) medicine around the world. The practice of cupping helps in treating many health problems and many studies have shown its effectiveness. The study target is to figure out if the hematological parameters are affected by wet cupping or not, and to determine the risk of anemia caused by wet cupping.

Methods:

The data were collected from 17 participants who participate in the study. The cupping was performed at cupping centers in Madinah, and the samples were processed in the research laboratory at Taibah University. The analysis of hematological parameters was done by comparing the samples of each participant before wet cupping, one week and two weeks after it.

Results:

The results of the study show that the wet cupping causes an increase, that were statistically significant, in many hematological parameters such as white blood cells count and hemoglobin level after performing wet cupping.

Conclusion:

Several hematological parameters were influenced after performing wet cupping while others did not. Wet cupping is generally safe, as it does not cause anemia, and it is recommended to be performed appropriately due to its health benefits.

Key words:

Wet cupping, Hijama, alternative medicine, hematological parameters, anemia.

الملخص

الخلفية والأهداف:

تعتبر الحجامة الرطبة أحد أهم أنواع الطب التقليدي (البديل) حول العالم. تساعد ممارسة الحجامة في علاج العديد من المشاكل الصحية وقد أظهرت العديد من الدراسات فعاليتها. تستهدف الدراسة معرفة تأثير الحجامة الرطبة على مؤشرات الدم ، وقياس خطر فقر الدم الناجم عن الحجامة الرطبة.

طريقة البحث:

تم جمع البيانات من ١٧ مشاركاً شاركوا في الدراسة. تم إجراء الحجامة في مراكز الحجامة بالمدينة المنورة وتمت معالجتها وفحصها في معمل الأبحاث بجامعة طيبة. تم إجراء الدراسة بمقارنة مؤشرات الدم المفحوصة من عينات كل مشارك قبل الحجامة الرطبة ، بعد أسبوع وبعد أسبوعين من الحجامة.

النتائج:

أظهرت نتائج الدراسة أن الحجامة الرطبة لها تأثير بزيادة بعض مؤشرات الدم مثل كريات الدم البيضاء وخضاب الدم (الهيموجلوبين) بعد إجراء الحجامة الرطبة.

الخلاصة:

تأثرت بعض مؤشرات الدم بعد إجراء الحجامة الرطبة والبعض الآخر لم يتأثر. الحجامة الرطبة آمنة بشكل عام ولا تسبب فقر الدم ويوصى بإجراءها بالطريقة الصحيحة نظراً لفوائدها الصحية.

الكلمات المفتاحية:

الحجامة الرطبة، الحجامة، الطب البديل، مؤشرات الدم، فقر الدم

1.Introduction

Cupping (Arabic term: Hijama), is known as the process of applying cups on different parts of the body to draw blood by making an incision (of wet cupping) or without incision (other types of cupping) [1]. It is considered as one of the traditional (alternative) medicine types around the world [2]. Cupping has an extended history along different centuries in different cultures, from East to West. Cupping in ancient times is different from the current time in the ways of its application and the instruments used. The practice of cupping was shown to help in treating many health problems and some studies have shown their effectiveness[3]. Methodologies of traditional cupping have been passed along the centuries by its practitioners [4]. Dry, wet, and massage are the three known cupping types [5]. In Saudi Arabia, wet cupping is the most common type that has been used until now. The Middle East, including Saudi Arabia, uses different wet cupping techniques from the one that is used in China, Korea and Germany [6]. Middle East technique usually utilize three order of steps which are cupping, puncturing, and then cupping again after making incision by a sharp surgical blade. On the other hand, Germany, China, and Korea use two steps procedure by using an auto-lancet for the puncturing. The two steps are puncturing and cupping [7, 8].

Cupping cups can be placed on many places in the human body including the back, neck, area of sacral, thigh and shoulders to relieve symptoms of many health problems such as arthritis and diabetes [9]. Based on the National Institute of Health (NIH) in the United States, cupping shows its effects in various symptoms such as chemotherapy, nausea and vomiting [3]. Cupping is mainly suggested as a complementary therapy in some conditions such as knee pain, sports injuries and performance, muscle pain and soreness, back pain, neck and shoulder pain, headache or migraine [10]. Cupping usually is safe when a professional person performs it on healthy people [2]. However, cupping is not recommended for people with some health problems due to its side effect. Also, cupping might cause pain and bruise. According to the National Center for Complementary and Integrative Health (NCCIH) in the United States, many side effects may result from cupping including hematoma (blood accumulated outside the blood vessels), persistent skin discoloration that leads to irregular patches areas where there are changes in skin color, scars (fibrous tissue that replaces normal skin after an injury), burns, bleeding which may occur with people who lacks the essential clotting factors such as factor VIII, or psoriasis (an autoimmune

disease characterized by patches of abnormal skin these skin patches are typically red), or purple on some people with darker skin, dry, itchy, and scaly[11]. Several contraindications prevent people from doing wet cupping which includes pregnancy, swelling, dry or cracked skin, hypotension, open wounds, and high fever. Even though some people believe that wet cupping can cause anemia, cupping is safe for anemic patients and does not cause anemia according to some studies[12].

Wet cupping has been used as a treatment for many years. In 2008, one study showed a relationship between cupping and Iron deficiency[10]. This study contradicts newer studies that show no effect of wet cupping on hemoglobin levels [12, 13]. Thus, there are limited studies available regarding cupping's effect on hematological parameters. Here, we asked whether the wet cupping has a significant influence on the hematological parameters or not. Our investigation will be comparing the samples of each participant before wet cupping, one-week after wet cupping and two weeks after wet cupping.

2. Materials and Methods

2.1 Study design and sampling method:

The design of this study is an experimental cohort prospective study. It is the most suitable design of the study since it requires a follow up with the participant to investigate the effect of wet cupping on the blood parameters. Also, to answer the question regarding the differences of the hematological parameters among people who do cupping.

2.2 Location of the study:

The cupping was performed at cupping centers in Madinah, Saudi Arabia. The cupping centers mainly provide wet cupping therapy for individuals who ask for it for different reasons.

2.3 Procedure of the study:

The data was collected from 17 volunteers who participated in the study. The blood sample was collected in Ethylene Diamine Tetra Acetate (EDTA) tube (the sample volume is about 3ml). The sample was collected immediately from the participant before cupping, one week and two weeks after cupping to compare the hematological parameters of each participant before and after cupping. To minimize physiological variations, the collection time of venous blood was performed from 10:00 AM to 2:00 PM and after 30 minutes from eating a mild meal. The total blood cells that include Red Blood Cell (RBC), White Blood Cell (WBC) and Platelet (PLT) were measured by using the automated method, Beckman machine (Atlanta Georgia, United States), that measure the complete blood count (CBC). The other

measured parameters include hemoglobin (HB), hematocrit (HCT), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red cell distribution width (RDW), platelet distribution width (PDW), mean platelet volume (MPV) and Plateletcrit (PCT).

2.4 Inclusion criteria:

The study focused on healthy male individuals in Madinah, who should be clear from any health concerns, and the age of volunteers ranged between 18-42.

2.5 Exclusion criteria:

We exclude all individuals who suffer from any health concerns such as hypertension or diabetes.

2.6 Ethical approval:

Ethical approval was obtained for the study from the research ethics committee of the College of Applied Medical Sciences at Taibah University via letter number SREC/AMS 2019/44/CLD dated: 18/11/2019. All participants who received wet cupping signed a form of consent indicating that their data would be used in this study and they have the right to withdraw anytime during the study and there is no personal information will be shared with others.

2.7 Cupping procedure:

The tools used in the cupping procedure including plastic cups, blades, and suction devices. The procedure of cupping usually involves cleaning the target area with an alcohol swab and placing the cup over a specific area and start suctioning. The cup is then gently removed, and three to four fine superficial incisions were made [the size of incisions is about 0.3 cm to 0.7 cm in length and 0.2 mm in depth parallel to each other]. After creating the incisions, the cup is placed again over the same area, and the suctioning is repeated. This procedure is performed on all or most of the cupping targets at the same time. The amount of blood removed in cupping is about 50-60 ml of blood and a maximum of 100 ml.

2.8 Statistical analysis: The statistical tests such as mean, standard deviation, student's t-test (dependent t-test), and p value are performed using statistical package for social science (SPSS) program. Differences were considered significant when the $p< 0.05$.

3.Results

The age of our participants in this study was ranged from 18 to 42 years. All the participants were males. The mean values of the participants WBC, RBC, HB, HCT, MCV, MCH, MCHC, RDW, PLT, MPV, PCT, and PDW were all written in (Table 1). All the participants had 5 cups of wet cupping, in which two cups in the shoulders and three cups in the back.

Several comparisons were obtained from

the participant's results to demonstrate the variation between their blood results before wet cupping and one week after wet cupping, then before wet cupping and two weeks after wet cupping (detailed in the next sections).

Table 1. Baseline characteristics of participants before wet cupping.

Baseline characteristic	Results (± SD)	Range	Reference Range*
Mean age	24.17 (± 5.67)	18-42	18-60
Mean WBC count	6.34 (± 2.04)	3.4-10.6	4-11 X 10^9/L
Mean RBC count	4.91 (± 0.41)	3.94-5.76	4.5-6.5 X 10^{12}/L
Mean HB level	12.82 (± 1.14)	10.7-14.8	13–18 g/dl
Mean HCT	40.94 (± 3.24)	32.3-47.4	40-52%
Mean MCV	83.71 (± 6.90)	64.8-93.5	80-100 fl
Mean MCH	26.25 (± 2.88)	19.1-30.1	26–32 pg
Mean MCHC	31.27 (± 1.34)	29.4-34.2	32-36 g/dl
Mean RDW	13.50 (± 1.63)	12.2-19	11.5-14.5%
Mean PLT	210.82 (± 59.39)	124-322	150-450 X 10^9/L
Mean MPV	8.82 (± 1.18)	6.8-11.5	9.4–12.3 fl
Mean PCT	0.19 (± 0.05)	0.11-0.20	≤ 0.15%
Mean PDW	16.21 (± 0.99)	13.1-17.5	10.0 - 17.9%

*Obtained from the World Health Organization (WHO).

3.1 Effect of wet cupping on White Blood Cells (WBCs) indices

3.1.1 Total White Blood Cells (WBCs) count:

We looked into the WBCs count. The mean before wet cupping was 6.34 (± 2) X 109/L (Table 1). This number increased to 7.5 (± 1.8) X 109/L after wet cupping by one week. Then, the mean decreased to 6.9 (± 1.6) X 109/L after two weeks of wet cupping (Table 2). The result shows that the WBCs count increased after one week of wet cupping but decreased after two weeks of wet cupping. Interestingly, a comparison of WBCs counts between before wet cupping and after one week of wet cupping showed a statistically significant difference (p= 0.02). However, a comparison of WBCs counts between before wet cupping and after two weeks of wet cupping showed no statistical significance (p= 0.33) (Table 2).

Table 2. Comparison between the WBCs counts before wet cupping, one week after wet cupping and two weeks after wet cupping.

Comparisons	Comparison between baseline and results one week after wet cupping	Comparison between baseline and results two weeks after wet cupping
Mean after wet cupping (± SD)	7.5 (± 1.8) X 10^9/L	6.9 (± 1.6) X 10^9/L
P value	0.02*	0.33

*Statistically significant at < 0.05

3.2 Effect of wet cupping on Red Blood Cells (RBCs) indices:

3.2.1 Total Red Blood Cells (RBCs) count: We moved to look at the RBCs count. The mean before wet cupping was 4.91 (± 0.41) X 1012/L (Table 1), then it decreased to 4.89 (± 0.5) X 1012/L after one week of wet cupping. Then it raised to 4.93 (± 0.5) X 1012/L after two weeks of wet cupping (Table 3). The result shows that the RBC count decreased after performing wet cupping. However, the RBC count reversibly increased after two weeks of wet cupping. The comparison of RBCs counts between before and after wet cupping showed non-statistically significant results (Table 3).

Table 3. Comparison between the RBCs indices before wet cupping, one week after wet cupping and two weeks after wet cupping.

Comparisons	Comparison between baseline and results one week after wet cupping	Comparison between baseline and results two weeks after wet cupping
Total Red Blood Cell (RBC)		
Mean after wet cupping (± SD)	4.89 (± 0.5) X 10^{12}/L	4.93 (± 0.5) X 10^{12}/L
P value	0.84	0.87
Hemoglobin (Hb)		
Mean after wet cupping (± SD)	13.74 (± 1) g/dl	13.5 (± 0.94) g/dl
P value	0.003*	0.03*
Hematocrit (HCT)		
Mean after wet cupping (± SD)	42.2 (± 3.17)%	41.58 (± 2.14)%
P value	0.18	0.49
Mean Corpuscular volume (MCV)		
Mean after wet cupping (± SD)	86.77 (± 6.41) fl	85.29 (± 6.36) fl
P value	< 0.001*	0.01*
Mean corpuscular hemoglobin (MCH)		
Mean after wet cupping (± SD)	28.31 (± 2.55) pg	27.28 (± 2.61) pg
P value	< 0.001*	< 0.001*
Mean corpuscular hemoglobin concentration (MCHC)		
Mean after wet cupping (± SD)	32.59 (± 1.18) g\dl	33.17 (±2.17) g\dl
P value	< 0.001*	0.006*
Red cell Distribution width (RDW)		
Mean after wet cupping (± SD)	14.34 (± 1.75)%	13.82 (± 1.98)%
P value	0.004*	0.4

*Statistically significant at < 0.05

3.2.2Hemoglobin (Hb):

We analyzed the Hb level, the mean before wet cupping was 12.82 (± 1.14) g/dl (Table 1). In the first week after wet cupping, the Hb level showed an increase in the mean value 13.74 (± 1) g/dl. Later (i.e. after two

weeks), the Hb level showed a slight decrease of 13.5 (± 0.94) g/dl (Table 3). Interestingly, these results were statistically significant in both comparisons, (p= 0.003) in the first comparison between before wet cupping and one week after and (p= 0.03) same with the second comparison between before wet cupping and two weeks after (Table 3).

3.2.3 Hematocrit (HCT):

In the analysis of HCT, the mean before wet cupping was 40.94 (± 3.24)% (Table 1), it increased in one week after wet cupping to 42.2 (± 3.17)%, then slightly decreased in two weeks after wet cupping 41.58 (± 2.14)% (Table 3). We observed non-statistically significant results in both comparisons.

3.2.4 Mean corpuscular volume (MCV):

We looked at the MCV level. The mean before wet cupping was 83.71 (± 6.9) fl (Table 1), it increased in one week after wet cupping 86.77 (± 6.41) fl and decreased in two weeks after wet cupping 85.29 (± 6.36) fl (Table 3). This result shows that the MCV level increased after one week of wet cupping but decreased after two weeks of wet cupping. The results show significant differences between the groups in both comparisons; (p< 0.001) in the first comparison between before wet cupping and one week after and (p= 0.01) in the second comparison between before wet cupping and two weeks after (Table 3).

3.2.5 Mean corpuscular hemoglobin (MCH):

We looked at the MCH level. The mean before wet cupping was 26.25 (± 2.88) pg (Table 1), it increased in one week after wet cupping 28.31 (± 2.55) pg, and decreased in two weeks after wet cupping 27.28 (± 2.61) pg (Table 3). These results show that the MCH level increased after one week of wet cupping but decreased after two weeks of wet cupping. The results show significant differences between the group in both comparisons; (p< 0.001) in the first comparison between before wet cupping and one week after and (p< 0.001) in the second comparison between before wet cupping and two weeks after (Table 3).

3.2.6 Mean corpuscular hemoglobin concentration (MCHC):

We analyzed the MCHC level, before wet cupping the mean was 31.27 (± 1.34) g/dl (Table 1), in the first week after wet cupping it showed an increase in the mean value 32.59 (± 1.18) g/dl, and then it also increased after two weeks of wet cupping 33.17 (± 2.17) g/dl. These results were statistically significant in both comparisons; (p< 0.001) in the first comparison between before wet cupping and one week after and (p= 0.006) in the second comparison between before wet cupping and two weeks after (Table 3).

3.2.7 Red cell distribution width (RDW):

We investigated the RDW ratio. The mean before wet cupping was 13.5 (± 1.63)% (Table 1). This number increased to 14.34 (± 1.75)% after wet cupping by one week. Then, the mean decreased to 13.82 (± 1.98)% after two weeks of wet cupping. This result shows that the RDW ratio increased after one week of wet cupping and decreased after two weeks of wet cupping. Interestingly, the comparison of the RDW ratio between before wet cupping and after one week of wet cupping shows a statistically significant difference (p= 0.004) (Table 3). However, a comparison of the RDW ratio between before and after two weeks of wet cupping shows non-statistical significance.

3.3 Effect of wet cupping on Platelets (PLTs) indices:

3.3.1 Platelets (PLT) count:

In the analysis of PLT, the mean before wet cupping was 210.8 (± 59.4) X 109/L (Table 1), it decreased after one week of wet cupping 208.1 (± 56.1) X 109/L, and increased after two weeks of wet cupping 209.8 (± 51.06) X 109/L (Table 4). We observed a non-statistically significant result in both comparisons.

3.3.2 Mean platelet volume (MPV):

We investigated the MPV level. The mean before wet cupping was 8.82 (± 1.18) fl (Table 1). This number increased to 9.94 (± 1.75) fl after one week of wet cupping. Then, the mean decreased to 8.74 (± 1.18) fl after two weeks of wet cupping (Table 4). The result shows that the MPV level increased after one week of wet cupping and decreased after two weeks of wet cupping. Comparison of MPV level between before wet cupping and after one week of wet cupping shows a statistically significant difference (p= 0.03). However, a comparison of MPV level between before wet cupping and after two weeks of wet cupping shows a non-statistical significance (p= 0.81).

Table 4. Comparison between the PLT indices before wet cupping, one week after wet cupping, and two weeks after wet cupping.

Comparisons	Comparison between baseline and results one week after wet cupping	Comparison between baseline and results two weeks after wet cupping
Platelets count (PLT)		
Mean after wet cupping (± SD)	208 (± 56.1) X 10^9/L	209.8 (±51.06) X 10^9/L
P value	0.89	0.94
Mean Platelet Volume (MPV)		
Mean after wet cupping (± SD)	9.94 (± 1.75) fl	8.74 (± 1.18) fl
P value	0.03*	0.81

Comparisons	Comparison between baseline and results one week after wet cupping	Comparison between baseline and results two weeks after wet cupping
Plateletcrit (PCT)		
Mean after wet cupping (± SD)	0.20 (± 0.03)%	0.18 (± 0.04)%
P value	0.22	0.71
Platelet Distribution Width (PDW)		
Mean after wet cupping (± SD)	15.7 (± 1.5)%	16.14 (± 0.9)%
P value	0.09	0.8

*Statistically significant at < 0.05

3.3.3 Plateletcrit (PCT):

For PCT, the mean before wet cupping was 0.19 (± 0.05)% (Table 1), it increased after one week of wet cupping 0.20 (± 0.03)% and decreased after two weeks of wet cupping 0.18 (± 0.04)% (Table 4). In the analysis of PCT, we observed a non-statistically significant result in both comparisons.

3.3.4 Platelet distribution width (PDW):

We moved to look at the PDW ratio. The mean before wet cupping was 16.21 (± 0.99)% (Table 1), it decreased to 15.7 (± 1.5)% after one week of wet cupping. Then it raised to 16.14 (± 0.9)% after two weeks of wet cupping (Table 4). The comparison of PDW between before and after wet cupping showed non-statistically significant results.

4.Discussion:

In this study, we show that wet cupping has a significant impact on several hematological parameters such as WBCs, Hb, MCV, MCH, MCHC, RDW and MPV. Although other parameters were still affected by wet cupping, it was not statistically significant.

4.1 Effect of wet cupping on total WBCs count:

White Blood Cells (WBCs) play a crucial role in the immune system by protecting the body from infectious disease and foreign substances[14]. The results of our study show that wet cupping influences the total WBCs count after one week, where the increase was statistically significant. In contrast after two weeks, it was not statistically significant. Measuring WBCs count is considered as one way for assessing the stimulation of the immune system. It has been known that the immune system could be enhanced by wet cupping[5]. Our result confirms the previous statement in which we observed a significant increase in the WBCs count after one week from performing wet cupping. However, when we measure the WBCs count after two weeks from performing wet cupping, we did not observe this significant increase. This observation is consistent with another study that shows no significant difference between WBCs count before wet cupping and two

weeks after wet cupping [1]. So, our study added additional evidence for the transient enhancement of the immune system upon wet cupping, and this observation triggers further investigation to understand the significance of this phenomenon. One of the main limitations of this study is that we did not compare the clinical conditions of participants, whether are they infected during the study duration. Besides, the variation of the results might be due to the cupping methodology that we and others applied.

4.2 Effect of wet cupping on RBCs indices:

4.2.1 Effect of wet cupping on RBCs count:

Red Blood Cells (RBCs) are responsible for delivering oxygen to the cells and tissues in which oxygen is carried by the hemoglobin, which is a constituent part of RBCs [15]. Counting the RBCs is considered as one way of assessing anemia [12]. The results of our study show that the wet cupping has no or minimal effect on the total RBCs count after one and two weeks of wet cupping. There were inconsistent results about the effect of wet cupping on RBCs count. Our results are consistent with the studies that show a minimal difference in the total RBCs count when it is measured before and after the wet cupping [11, 16]. On the other hand, there is one study that shows a statistically significant decrease ($p= 0.04$ in a cohort of 48 participants) of the total RBCs count when it is measured after two weeks of the wet cupping [1]. It is essential to mention that the decreased RBCs count reported in our study was not clinically significant (i.e. it did not cause anemia).

One of the main arguments against wet cupping is the possibility of wet cupping causing anemia. Our results showed that RBCs count is not significantly decreased after the wet cupping procedure. This is also observed in many other studies [1, 12]. It is important to mention that these results are based on following standard wet cupping protocols that prohibit frequent wet cupping procedures and a high number of incisions [6, 17-20].

4.2.2 Effect of wet cupping on Hb level:

Hemoglobin (Hb) is an RBCs that contained a protein, that has a function in oxygen delivery [21-23]. Measuring Hb level is considered as one way of assessing polycythemia (the increase in RBCs hematocrit or hemoglobin level when measuring in CBC as compared to reference range) [24]. The results of our study show that wet cupping has a significant effect on Hb level after one and two weeks. There were inconsistent results on the impact of wet cupping on the Hb level. For instance, some studies show that there is a minimal difference in the Hb level when it is measured before and after the wet cupping [12, 17]. Other studies, which are consistent with our results, showed that there was a sta-

tistically significant difference in the Hb level when it is measured before and after wet cupping [1, 5]. Again, we did not observe anemia upon wet cupping. Therefore, our study is confirming the safety of wet cupping as it will not cause anemia if it is performed properly.

4.2.3 Effect of wet cupping on HCT level:

The term Hematocrit (HCT) is known as the measuring of the volume of packed RBCs relative to whole blood. It is also known as packed cell volume (PCV). It is a simple test used to recognize a condition such as anemia and polycythemia. This test is also used for monitoring drug response [18]. The results of our study show that the wet cupping has no or minimal effect on the HCT level after one and two weeks of wet cupping. Our results are consistent with previous reports that show no significant difference in hematocrit level when it is measured before and after wet cupping [16, 17].

4.2.4 Effect of wet cupping on MCV:

Mean Corpuscular Volume (MCV) is a laboratory measurement that determines the average size and volume of RBCs. It is useful and helpful in determining the cause of anemia [19]. The results of our study show that the wet cupping has a noticeable effect on the MCV level after one and two weeks of wet cupping. There were inconsistent results on the impact of wet cupping on the MCV level. These reports show that there is a minimal difference in the MCV level before and after the wet cupping [1,12]. On the other hand, our result was consistent with one study that showed a significant difference in MCV level when measured before and after wet cupping [25].

4.2.5 Effect of wet cupping on MCH:

Mean Corpuscular Hemoglobin (MCH) is the average amount of hemoglobin per single RBC in a blood sample. It is a useful tool that helps in determining hypochromic anemia [20]. The results of our study show that the wet cupping has a significant effect on MCH level after one and two weeks of wet cupping. There were inconsistent results about the effect of wet cupping on the MCH level show that there is a minimal difference [1,12]. There is a study, which is consistent with our results, show that there is a significant difference in MCH level when it is measured before and after the wet cupping [25].

4.2.6 Effect of wet cupping on MCHC:

Mean Corpuscular Hemoglobin concentration (MCHC) is known as the measuring concentration of hemoglobin in a specific blood sample. It is a useful tool in determining iron deficiency [26]. The results of our study show that the wet cupping has a significant effect on the MCHC level after one and two weeks of wet cupping. There were inconsistent results on the impact of

wet cupping on the MCHC level showed that there is a minimal difference[1]. Some studies, which are consistent with our results show that there was a significant difference in the MCHC level when it is measured before and after wet cupping [17, 25].

4.2.7 Effect of wet cupping on RDW:

Red Cell Distribution Width (RDW) is a simple and cheap parameter that shows the degree of heterogeneity of erythrocyte volume. It is useful in the differential diagnosis of anemia [8, 27]. The results of our study show that the wet cupping influences RDW after one week, where the increase was statistically significant. However, RDW is not statistically significantly different after two weeks.

4.3 Effect of wet cupping on PLT indices:

4.3.1 Effect of wet cupping on PLT count:

Platelets (PLTs) also called thrombocytes are tiny cells that are important for normal blood clotting [21]. Measuring PLT count is considered an essential way in the assessment of bleeding disorder, or excessive clotting disorder [22]. The results of our study show that wet cupping has no or minimal effect on the total PLT count after one week and after two weeks of wet cupping. There was an inconsistent study about the impact of wet cupping on PLT count [1]. There is a study, which is consistent with our result, show that there was minimal difference in the total PLT count when it measured before and after wet cupping [16].

4.3.2 Effect of wet cupping on MPV:

Mean Platelet Volume (MPV) is a laboratory test associated with platelet function and activity; it is considered an important indicator for the thromboembolic disease[23]. The results of our study show that the wet cupping influences the MPV after one week, where the increase was statistically significant. On the other hand, the MPV was not statistically significant after two weeks. Our result is aligned with the previous statement in which we observed a significant increase in the MPV after one week. However, when we measure MPV after two weeks from performing the wet cupping, we did not observe a significant increase.

4.3.3 Effect of wet cupping on PCT:

Plateletcrit (PCT) Is the measurement of total platelet mass [24]. The results of our study showed that wet cupping has no or minimal effect on PCT after one and two weeks of wet cupping.

4.3.4 Effect of wet cupping on PDW:

Platelet distribution width (PDW) is the calculation of platelet anisocytosis that is measured from the distribution of person platelet volume [25]. The results of our study show that wet cupping has no or minimal effect on PDW after one and two weeks of wet cupping.

5.Conclusion:

Wet cupping has a significant effect on hematological parameters, and it is also safe when it is performed by trained people in the right way. Based on our findings, we are suggesting studying the effect of wet cupping on hematological parameters in a larger cohort. Furthermore, it is worthwhile to study the significance of the transient elevation of WBCs count and its correlation with different WBC cells as well as other immunological biomarkers.

Acknowledgment

We would like to thank all participants. We would also like to thank participating Cupping Centers for their collaboration and for providing an extra discount to the participants in this study.

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