SPORT TK-EuroAmerican Journal of Sport Sciences

https://revistas.um.es/sportk Online ISSN: 2340-8812

Received: **25/09/2025.** Accepted: **24/01/2026.** Published: **06/07/2026**

Effect of cupping therapy versus moderate-intensity aerobic exercise on the lipid profile in women with diabetes

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ABSTRACT

This study aimed to find out the effect of wet cupping versus moderate-intensity aerobic exercise on lipid profile and blood sugar in diabetic obese women. Sixty diabetic women took part in this study; their ages ranged from 40 to 60 years, and their Body Mass Index (BMI) ranged from 30 to 34.9 kg/m². They were randomly allocated into two groups; group A received medication and moderate aerobic exercise three times per week for eight weeks, and group B received medication and wet cupping two times at two months. Triglycerides, cholesterol, LDL cholesterol, and HDL cholesterol were measured before and after eight weeks at the end of the study. The study demonstrated a statistically significant reduction in the triglyceride levels ($p<0.01$). Total cholesterol ($p<0.01$) and LDL ($p<0.05$) levels decreased significantly in both groups. HDL levels increased significantly in

Group A ($p<0.01$), whereas no significant increase was observed in Group B ($p>0.05$). It was that aerobic exercise was more effective than wet cupping therapy on the lipid profile in diabetic women.

KEYWORDS

Aerobic Exercise; Lipid Profile; Cupping Therapy; Diabetic Women

1. INTRODUCTION

Diabetes mellitus, sometimes referred to simply as diabetes, is a metabolic condition affecting carbohydrates, proteins, and fats, resulting from either the body's inability to utilize insulin or insufficient insulin production. Initially, DM is defined as insulin-resistant, where the body does not react to insulin anymore, and as the disease becomes worse, it can lead to insulin deficiency. As illness gets worse, insulin shortage happens on its own. Non-Insulin Dependent DM (NIDDM), or previously called “adult-onset DM”, is the disease. The predominant cause is obesity and inactivity (Klisic et al., 2017; Shoback & Gardner, 2018).

Diabetes significantly contributes to atherosclerotic cardiovascular disease (ASCVD), with diabetes-related dyslipidemia being strongly linked to a high incidence of ASCVD, independent of blood sugar levels. This type of dyslipidemia in diabetic patients is typically marked by increased triglycerides, decreased high-density lipoprotein cholesterol, as well as a predominance of small, dense low-density lipoproteins (Gad Allah et al., 2025).

Cupping is an Islamic therapeutic tool, which is used in different nations around the world. It is a traditional Chinese medical practice which is used in promoting health, preventative care, and healing. Cupping therapy has proven effects on the treatment of diseases of local origin (such as neck pain, lower back pain, and knee pain) and systemic diseases (diabetes mellitus, hypertension, and rheumatoid arthritis) (Colberg et al., 2010).

Cupping suction genetic hypothesis: mechanical stress, local anaerobic metabolism (even partial O_2 deprivation) due to sub-atmospheric and/or physical signals may be generated (during the cups), which can activate/suppress gene expression according to the genetic hypothesis. A wet cupping treatment certainly stimulates the wound healing response and gene expression program by surface scarifications, like in surface cupping (Aboushanab & AlSanad, 2018).

Each of these methods uses composite material containers to develop a vacuum over an arbitrary area of skin. Dry cupping procedure: This method of suctioning is used to withdraw a small amount of blood as well as interstitial fluid from the body, normally after making mild skin incisions

or superficial abrasions; incomparably less when compared to well-concertinaed bloodletting (Mahmoud et al., 2022). Robust evidence indicates that complementary as well as alternative therapy, also referred to as traditional medicine, can aid in disease prevention, and the management of non-communicable diseases, along with the enhancement of quality of life for individuals with chronic conditions (Patel et al., 2017).

Aerobic exercise, or endurance activities, cardio, and cardio-respiratory exercise are any types of physical activities that depend heavily on oxygen, using the aerobic energy-generating system, and are typically of variable intensity. Aerobic means "involving oxygen", and this is where aerobic metabolism comes in, whereby enough oxygen can meet energy demands for the "endurance exercise". Aerobic exercise generally consists, at least in theory, of light to moderate activities being repeated often enough over time. Examples of cardiovascular or aerobic exercises include moderate to long-distance running or jogging, swimming, cycling, stair climbing, and walking (Weiss et al., 2016).

Physical activity may be used as a modifiable factor for CVD risk factors at primary prevention. They reported a reduction in plasma LDL-C and TGs (triglycerides), as well as an increase in HDL-C levels along with the HDL-C/LDL-C (HDL-C/LDL-C) ratio (Doewes et al., 2023). Weiss et al. (2016) showed that aerobic exercise (AE) positively influences blood pressure, TGs, and TC, with no effect on HDL-C more specifically (Akcakoyun, 2010).

There is consensus that physical inactivity and insufficient cardiorespiratory fitness are risk factors for coronary heart disease (CHD). A proposed mechanism to elucidate the proposed preventive impact of regular physical activity on CHD involves beneficial alterations in blood lipids, namely an elevation in HDL-C and a reduction in triglycerides. Aerobic exercise is an economical intervention for behavioral lifestyle modification aimed at altering cholesterol and lipoprotein levels in adults. Research on the importance of alterations in lipids as well as lipoproteins, primarily due to exercise in adults (Farahmand et al., 2014). The purpose of the study is to compare the impacts of cupping therapy as well as moderate-intensity aerobic exercise on lipid profile in diabetic women.

2. METHODS

2.1. Study Design and Participants

The design of this study was a randomized controlled study. Upon completion of the consent form, the recruited patients were randomly allocated to two separate groups. Group A was treated with moderate-intensity aerobic exercises that involve walking on a treadmill machine, three

sessions/week, for eight weeks. Group B was treated with wet cupping therapy once per month for 2 months, one session of cupping therapy per month. Both groups take diabetic medication.

Sixty diabetic women took part in this study. They were selected from Deraya University, Faculty of Physical Therapy, Minia, Egypt, from May 2024 to March 2025. They aged between 40 and 60 years were recruited from the outpatient clinic of Deraya University. All participants had diabetes for over 10 years, with a BMI ranging from 30 to 34.9 kg/m^2. All patients were administered an oral hypoglycemic medication without any lipid medication. Patients with hepatic diseases, cardiac or chest disease, cancer, renal failure, orthopedic issues or extremity fractures, and neurological disorders, e.g., hemiplegia, Parkinsonism, and epilepsy, were excluded from this study. The study received authorization from the Ethical Committee of the Faculty of Physical Therapy at Cairo University (P.T. REC/012/005162).

2.2. Sample Size

Sixty women with diabetes participated in this study. The sample size was determined using the G*power program 3.1.9 (version 3.1, Heinrich-Heine-University, Düsseldorf, Germany). Calculations were conducted utilizing α=0.05, power 80%, effect size = 1.104, as well as an allocation ratio of N2/N1 = 1 for the comparison of two independent groups. The minimum requisite sample size for this study was 56 diabetic women, which was augmented to 60 to account for potential dropout (30 diabetic women in each group).

2.3. Randomization

Using the envelope method, the diabetic women were randomly divided into two equal groups. Cards with the words "Wii Fit" or "WBV" written on them were sealed in envelopes after patients consented to take part in the study. A physical therapist, who was blinded, was then instructed to choose one of the envelopes. Diabetic women were placed in the appropriate group based on the card that was chosen. The allotted therapy was started on predetermined dates following the first week of randomization (figure 1).

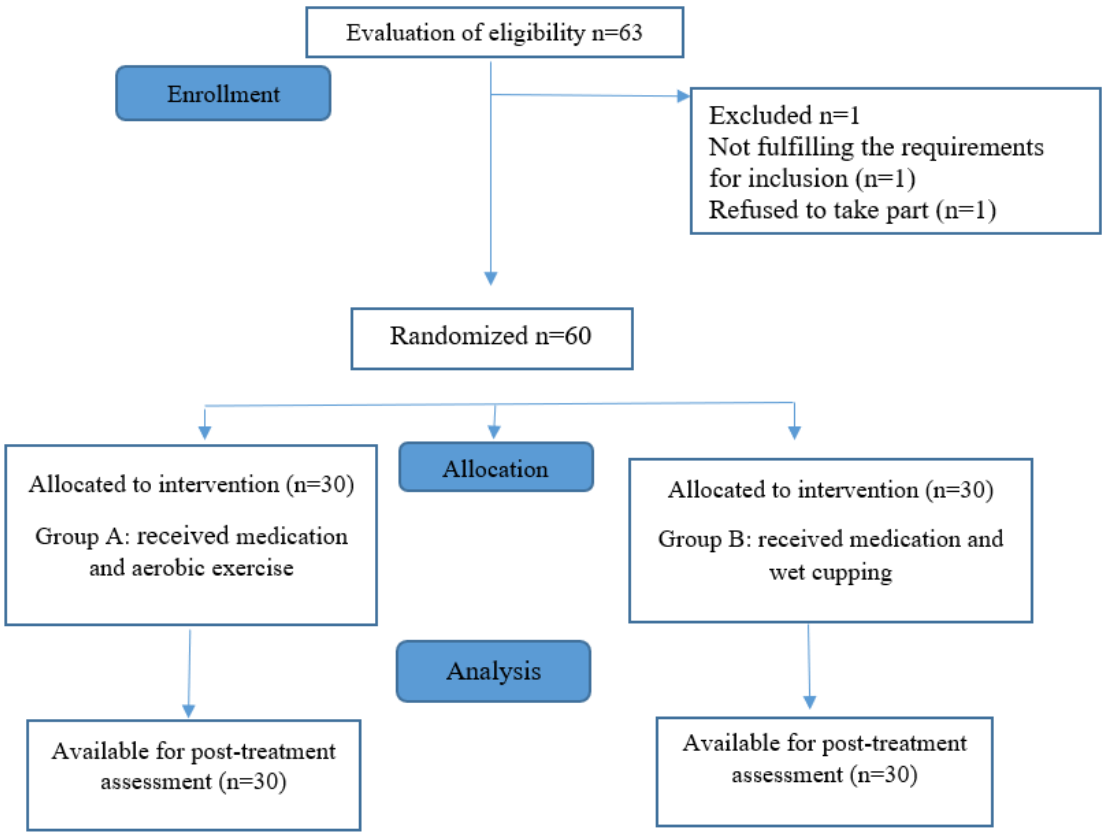

Figure 1. Patient randomization flowchart

2.4. Evaluation Instruments

Body weight and height were measured using a health scale (Model MC, RTZ-120A; made in China) to calculate body mass index (BMI) before the start of the study in both groups. Blood samples were collected before and after the intervention to determine total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and blood glucose levels in both groups. A pulse oximeter was used to measure pulse rate.

2.5. Treatment Instruments

Moderate-intensity aerobic exercise was performed using a Kettler treadmill (manufactured in the UK) with a maximum user weight capacity of 120–150 kg. Cupping therapy was administered using standard cupping equipment. Laboratory assessments were conducted before and after the 8-week intervention in both groups. Blood samples were collected from the antecubital vein after a 12-hour overnight fast and drawn into EDTA-containing vacutainer tubes under standardized conditions and at consistent time points. The samples were centrifuged at 3000 rpm for 10 min and subsequently

stored at −70 °C until analysis. Total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and blood glucose levels were determined using enzymatic colorimetric assays.

2.6. Treatment Procedures

Group A (Control Group). Thirty patients received their prescribed diabetes medication in combination with a moderate-intensity aerobic exercise program. Before the intervention, the exercise protocol was explained to all participants. The exercise program consisted of treadmill walking performed three times per week for 8 weeks. Exercise intensity was maintained at 60–75% of the maximum heart rate (MHR), calculated using the formula MHR = 220 − age, and monitored using the treadmill heart rate sensor. Each session lasted 40–50 minutes and included a 5–10-minute warm-up, 30 minutes of conditioning exercise at the target intensity, and a 5–10-minute cool-down period.

Group B (Experimental Group). Thirty patients received their prescribed diabetes medication in combination with wet cupping therapy. Wet cupping was administered once monthly for two months according to the Al-hijama protocol. Before each session, participants were instructed to fast for at least 2 hours. Each treatment session lasted 30–45 minutes and targeted the seventh cervical vertebra (GV14), 5 cm below C7 (Al-khial), the right and left occipital points (GB20), the area between the scapulae, the paraspinal and lumbosacral regions (right and left sides of the third to fifth lumbar vertebrae and the area above the fifth lumbar and first sacral vertebrae), and the point located at the lateral border of the first metatarsophalangeal joint at the junction between the dorsal dark skin and plantar light skin, which is traditionally associated with uric acid (Patel et al., 2017).

Wet Cupping Procedure. Before suction was applied, the physiotherapist identified the treatment sites and disinfected the skin. Cups were then placed over the selected areas, and suction was applied for 3–5 minutes. After cup removal, the skin was disinfected again before scarification. Scarification was performed sequentially from right to left, with 5–7 superficial incisions per cup (15–25 incisions in total, depending on cup size), using a No. 11 surgical scalpel blade. For wet cupping, the skin was punctured using a sterile needle and auto-lancing device to a depth of no more than 1–2 mm. All cupping equipment was single-use, sterile, and discarded after each treatment to minimize the risk of infection. Following blood removal, the treated areas were disinfected again, and appropriately sized adhesive dressings were applied and maintained for 48 hours.

2.7. Statistical Analyses

Subject characteristics were compared among the groups utilizing an unpaired t-test. The Shapiro-Wilk test was employed to assess the data for normal distribution. Levene's test was employed to assess the homogeneity of variances among groups. A mixed-design MANOVA was conducted to examine both within-group and between-group effects on lipid profile levels. Subsequently, post hoc tests with Bonferroni correction were performed for multiple comparisons. A significance threshold of $p < 0.05$ was set for all statistical analyses. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 25 for Windows (IBM SPSS, Chicago, IL, USA).

3. RESULTS

Table 1 represents the independent t-test of the general characteristics of subjects between group A and group B.

Table 1. Mean values of general characteristics of subjects between group A and group B

	Group (A)	Group (B)		
	Mean ±SD*	**Mean ±SD**	**t value**	***p* value**
Age (years)	50.61 ± 8.97	50.93 ± 8.72	0.22	0.47
Weight (kg)	81.32 ± 5.09	82.04 ± 4.98	-0.47	0.50
Height (cm)	158.98 ± 4.37	158.18 ± 4.46	0.83	0.35
BMI (kg/m²)	32.37 ± 1.23	32.45 ± 1.35	0.05	0.12

Note. **SD, Standard deviation; MD, Mean difference; p-value, Probability value*

The statistical analysis indicated no substantial difference ($p>0.05$) in values of mean general characteristics of subjects, including age, height, weight, and BMI between group A and group B. Table 2 shows the changes in the lipid profile of participants in Group A (Aerobic Exercise) before and after treatment.

Table 2. Pre- and post-treatment lipid profile in group A (aerobic exercise)

	Pre-treatment mean ± SD	**Post-treatment mean ± SD**	**Percent of improvement**	**Mean Difference**	***p* value**
Triglycerides (TG) (mg/dl)	185.42±14.60	153.17±13.29	17.39%	-32.25	0.001
Total cholesterol (TC) (mg/dl)	245.21±16.37	215.29±15.76	12.20%	-29.92	0.001
LDL-C (mg/dl)	161.38±14.92	144.23±13.85	10.63%	-17.15	0.001
HDL-C (mg/dl)	39.03±4.24	42.87±4.61	9.84%	3.84	0.001

Note. ** Significant values, data are expressed as mean ± SD*

As observed in Table 2, a paired t-test among prior to as well as following treatment revealed that there was a statistically substantial decrease in triglycerides, total cholesterol, and LDL-C (P<0.05), in addition substantial increase in the mean value of HDL-C there (P<0.05). The percentage of improvement for triglycerides, total cholesterol, LDL-C, and HDL-C was 17.39%, 12.20%, 10.63%, and 9.84%, respectively, for group A. Table 3 presents the pre- and post-treatment lipid profile of participants in Group B (cupping therapy).

Table 3. Pre- and post-treatment lipid profile in group B (cupping therapy)

	Pre-treatment mean ± SD	**Post-treatment mean ± SD**	**Percent of improvement**	**Mean Difference**	***p* value**
Triglycerides (TG) (mg/dl)	182.51±13.9	165.62±12.6	9.25%	-16.89	0.01
Total cholesterol (TC) (mg/dl)	243.05±17.2	222.96±16.4	8.27%	-20.09	0.01
LDL-C (mg/dl)	159.37±13.4	147.28±12.2	7.59%	-12.09	0.05
HDL-C (mg/dl)	38.88±3.9	40.25±4.3	3.52%	+1.37	0.14

Note. **Significant values, data are expressed as mean ± SD*

As observed in Table 3, a paired t-test among prior to as well as following treatment revealed that there was a statistically substantial reduction in triglycerides, total cholesterol, and LDL-C (P<0.05). However, the change in HDL-C was not statistically significant (P>0.05). The percentage of improvement for triglycerides, total cholesterol, LDL-C, and HDL-C was 9.25%, 8.27%, 7.59%, and 3.52%, respectively, for group B. Table 4 compares the lipid profile of Group A (aerobic exercise) and Group B (cupping therapy) before and after treatment.

Table 4. Comparison of lipid profile pre- and post-treatment

Lipid profile (mg/dl)	**Group (A) pre Treatment**	**Group (A) post treatment**	**Group (B) pre Treatment**	**Group (B) post treatment**	***p* value (G A v G B) Post treatment**
Triglycerides (TG)	185.42±14.60	153.17±13.29	182.51±13.9	165.62±12.6	0.01
Total cholesterol (TC)	245.21±16.37	215.29±15.76	243.05±17.2	222.96±16.4	0.01
LDL-C	161.38±14.92	144.23±13.85	159.37±13.4	147.28±12.2	0.05
HDL-C	39.03±4.24	42.87±4.61	38.88±3.9	40.25±4.3	0.05

Note. **Significant values, data are expressed as mean ± SD*

Among groups, prior to treatment, there was no substantial difference between both groups (A & B) in the mean value of triglycerides, total cholesterol, LDL-C, and HDL-C. Whereas following treatment, there was a statistically substantial difference between both groups (A & B) in the mean value of triglycerides, total cholesterol, LDL-C, and HDL-C (in favor of group A).

Although cupping therapy also improved lipids, aerobic activity resulted in much lower triglycerides, total cholesterol, and LDL-C levels. This implies that in obese diabetic women, moderate-intensity aerobic exercise is more effective than cupping in lowering cardiovascular risk factors.

Both groups exhibited significant improvements statistically in lipid profiles after 8 weeks of intervention. However, group A (aerobic exercise) showed significantly higher improvements in total cholesterol, LDL-C levels, and triglycerides, with a little but encouraging trend in HDL-C.

4. DISCUSSION

In the current study, we aimed to investigate lipid profile changes induced by wet cupping therapy and moderate-intensity aerobic exercise as supplementary interventions for dyslipidemia and in response to diabetic obese women, which is novel in non-pharmacological treatment of diabetic obesity-related dyslipidemia. The significant effects seen with both interventions in all variables ($P<0.05$) except HDL-C as there was only significant improvement with aerobic exercise ($p<0.05$) and there was no significant improvement in HDL-C in group B wet cupping ($p<0.05$), while perhaps very different in mechanisms and thus efficacy, are congruent with and extend prior research.

Lipid parameters: Aerobic exercise shows a strong beneficial effect that is probably attributable to the well-studied role of exercise in modulating lipoprotein metabolism. Our findings match with Weiss et al. (2016) who showed that “regular aerobic activity” increases lipoprotein lipase activity, which means triglyceride clearance and HDL-C production = stress induced by Weiss et al. (2016); Doewes et al. (2023). Results indicate that this is in agreement with our study; the relevant exercise most likely lowered LDL-C and triglycerides, while increasing HDL-C, due to the metabolic benefits of aerobic cardiorespiratory activation. Wet cupping, on the other hand, displayed small findings, which are in part probably linked to the locally damaging and anti-inflammatory effects of mechanical stress rather than direct metabolic modulation. A partial effectiveness of cupping (Abdelfattah et al., 2024), which is compatible with our results: cupping likely decreased LDL cholesterol and blood viscosity and enhanced HDL-C, microcirculatory, blood viscosity, and microcirculation abnormalities previously noted in hypertensive patients (Alajwad et al., 2024),

might be based on a genetic hypothesis that cupping activates tissue repair and gene expression. Though cupping sessions were infrequent (once monthly), they may not have accumulated the same cumulative effectiveness as thrice-weekly exercise.

The lipid-modifying effects of aerobic exercise are also in keeping with its systemic impact on insulin sensitivity and oxidative metabolism, which impacts beyond the target organs themselves. Exercise increases hepatic LDL receptors, improving LDL-C clearance, yet at the same time decreases visceral adiposity, a major issue for dyslipidemia in obesity (Colberg et al., 2010). On the other hand, the purported benefit of wet cupping may be partly explained by its effect on reducing low-grade inflammation (a modifiable driver of insulin resistance and atherogenic lipid profiles, Klisic et al. (2017). Cupping scarification is likely to have induced transient stimulation of antioxidant responses as indicated by Gad Allah et al. (2025). However, this requires more biochemical analysis. Additionally, our findings are consistent with the findings of another study, which demonstrated that cupping could enhance psychological well-being by reducing depression, hostility, and aggression (Ucun, 2022).

The findings of this study align with those of Elbably et al. (2023), who observed that enhanced glycemic control by aerobic exercise consistently correlates with a decrease in serum malondialdehyde, a dependable indicator of lipid peroxidation. Aerobic exercise enhanced the activity of endogenous antioxidants, specifically glutathione peroxidase, as well as reduced low-density lipoprotein content. Aerobic exercise positively influenced the lipid profile, enhancing all variables: HDL, LDL, triglycerides, and total cholesterol.

In addition, Rothenbacher et al. (2006) concluded that aerobic exercise could influence blood lipid metabolism. Exercise enhances serum lipid profiles among individuals with hyperlipidemia by reducing blood triglycerides, TC, and LDL-C, while elevating HDL-C levels.

The findings of this study align with those of Rahman et al. (2020), who indicated that wet cupping therapy is not detrimental to health; rather, it may be advantageous as a prophylactic and/or supplementary treatment for hyperlipidemia, hyperglycemia, and hypertension, in addition to in the prevention and management of DM.

Additionally, another study by Hairon et al. (2017) indicated that two sessions of wet cupping therapy substantially improved serum LDL-C as well as triglyceride classifications from borderline high to near optimal and normal, respectively, as per the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III.

Conversely, our findings contradict those of Farahmand et al. (2012), who reported that wet cupping did not exert a significant effect ($p>0.05$) on lipid profiles in a randomized controlled trial involving 63 patients. In contrast, Mahdavi et al. (2012) demonstrated a significant improvement ($p < 0.05$) in the lipid profiles of a randomly selected cohort of healthy volunteers who participated in wet cupping.

The findings of this study contrast those of Saritas, (2012), who reported a significant increase in LDL levels accompanied by a substantial reduction in HDL levels following an 8-week aerobic training program affecting lipid profiles.

This study offers interesting comparative data, but the research has several limitations. Eight weeks is a short term to see lipid changes in long cupping therapy, especially since the persistence of effects for cupping requires longer observation than this. The lack of a medication-only control group makes it difficult to specifically account for intervention-related outcomes. Finally, the monthly cupping protocol, despite being in comparison with traditional practices, may not be intense enough to compete with the metabolic effects elicited from exercise. Longer-term (e.g., at least a year) follow-up studies with increased sample size and mechanistic analyses should be performed to identify pathways relevant for the cupping effect.

Regarding the clinical implications, aerobic exercise is the basis of lifestyle modification for diabetic dyslipidemia and a very efficient, feasible modality with cost benefits. Though wet cupping is less effective for lipid modulation than dry cupping, it might be an alternative treatment for immobile people seeking complementary therapies. Cupping for symptomatic relief or more complete cupping care as stated by Mohammadi et al. (2019) should be considered a complement to exercise prescription from the clinician.

5. CONCLUSIONS

The present study highlights differences in the effects of aerobic exercise and wet cupping therapy on the lipid profile of postmenopausal women with diabetes. Although aerobic exercise appears to be more effective for improving metabolic outcomes, wet cupping therapy may serve as a useful adjunctive intervention. These findings underscore the importance of individualized, multimodal approaches to diabetes management.

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ACKNOWLEDGMENTS

Authors would like to thank especially Dr Waal Gomaa for their effort and the constant support over the period of this research, the expertise and encouragement of both of them played a very important role in shaping this work. Also thank all participants in this study.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding.