Combined (physical and medical treatment) therapy versus physical treatment alone and medical treatment alone in the management of chronic pelvic inflammatory disease

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Context
Pelvic inflammatory disease (PID) is the inflammation of the upper genital tract involving the fallopian tubes as well as the ovaries. Symptoms of PID are fever, cervical motion tenderness, lower abdominal pain, new or different discharge, painful intercourse, uterine and adnexal tenderness, and irregular menstruation.
Aim
The aim was to determine the therapeutic efficacy of combined shortwave diathermy and medical treatment in the management of chronic PID in comparison to either therapy alone.
Materials and methods
Sixty participants were recruited and diagnosed as chronic PID for more than 6 months by history, clinical examination, cervical swab, and ultrasonography. They were divided into three groups:
Statistical analysis
Descriptive and analytic study by SPSS version 16 on IBM compatible computer.
Results
There was a statistically highly significant clinical improvement regarding itching, discharge and pain relief, laboratory improvement regarding the number of pus cells in cervical swab, and radiological improvement regarding US parameters in the first group of patients with PID compared with the baseline and compared with other groups.
Conclusion
The greatest therapeutic efficacy can be obtained from combined physical and medical treatment compared with each line alone in the treatment of chronic PID.

Keywords:
combined therapy, medical treatment, pelvic inflammatory disease, physical therapy, shortwave diathermy, visual analog scale

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Introduction

Pelvic inflammatory disease (PID) and upper genital tract infection describe inflammatory changes in the upper female genital tract including any of the following combinations: endometritis, salpingitis, tubo-ovarian abscess, and peritonitis in the small pelvis and in most cases the infection is ascending. The spectrum ranges from subclinical, asymptomatic infection to severe, life-threatening illness [1–4].

Symptoms of PID include fever, cervical motion tenderness, lower abdominal pain, new or different discharge, painful intercourse, uterine and adnexal tenderness, or irregular menstruation [2]. Tubal sterility, ectopic pregnancy, and tubo-ovarian abscess are the long-term sequel [4]. Chronic PID refers to both residue of acute and subacute recurrence of a previous infection [4,5].

The aim of PID management is to alleviate pain and systemic malaise associated with infection, to achieve microbiological cure, to prevent the development of permanent tubal damage with associated sequels such as chronic pelvic pain, ectopic pregnancy, and infertility and to prevent the spread of infection to other parts [4].

It is widely claimed that shortwave diathermy (SWD) can be used to reduce pain and swelling, accelerates the anti-inflammatory process, and promotes healing in tissues with chronic inflammation. The SWD is high-frequency electromagnetic waves (current is of high alternating frequency) that do not stimulate motor or sensory nerves; it is a form of radiofrequency radiation, operating at a frequency of 27.12 MHz, used therapeutically by physiotherapists [4–6].

Application of SWD to the involved tissues may increase vascular circulation which directly results in vascular dilatation, increase in pain threshold, and a decrease in pain and swelling. Such vascular improvement also encourages resolution of the inflammatory processes by increasing nutrition, oxygen supply, and by removing metabolic and waste products and in turn promotes natural resistance to infection [4,7].

For women with PID of mild to moderate severity, parenteral and oral therapies appear to be effective [8]. Typical regimens include second-generation cephamycin plus macrolides and lincosamide plus aminoglycosides.

Aim

The aim was to compare the therapeutic efficacy of combined (medical and physical treatment) therapy with medical treatment only and physical treatment only for the management of chronic PID.

Participants and methods

Participants

The present study included 60 participants diagnosed as chronic PID and met the inclusion criteria referred from the gynecology clinics to Physical Medicine, Rheumatology and Rehabilitation Department, Menofiya University Hospitals.

Inclusion criteria

Patients diagnosed as PID according to CDC diagnostic criteria for PID [9] for more than 6 months by history, clinical, and laboratory (microbiological) examination indicating the presence of pus cells.

(1) CDC Diagnostic Criteria for the Diagnosis of PID [9].
(2) Minimal criteria*.
(3) Lower abdominal tenderness, uterine/adnexal tenderness, cervical motion tenderness.
(4) Additional criteria.
(5) Oral temperature greater than 38.3°C (101°F).
(6) Abnormal cervical or vaginal mucopurulent discharge.
(7) Presence of white blood cells (WBCs) on saline microscopy of vaginal secretions.
(8) Elevated erythrocyte sedimentation rate.
(9) Elevated C-reactive protein level.
(10) Laboratory documentation of cervical infection with *Neisseria gonorrhoeae* or *Chlamydia trachomatis*.
(11) Definitive criteria.
(12) Histopathologic evidence of endometritis on endometrial biopsy.
(13) Transvaginal sonography or MRI techniques showing thickened, fluid-filled tubes with or without free pelvic fluid or tubo-ovarian complex.
(14) Laparoscopic abnormalities consistent with PID.
(15) Practically gynecologists diagnoses patients with PID regarding all minimal criteria±one or more of additional criteria.

Exclusion criteria

Those with acute PID and other acute genital infections, intrauterine device/implants, cardiac pacemaker, active tuberculosis, tumor, pregnancy, skin sensation defect, severely ill patients, intolerance to oral antibiotics, analgesics, and electromagnetic therapy.

Methods

Informed consent was written by patients who participate in the present study.

(1) Full clinical examination which includes general and local examination.
(2) General examination: pulse, blood pressure, temperature, respiratory rate, chest, abdomen, etc.

Local examination

(1) Bimanual examination to ascertain the criteria of PID as cervical motion tenderness, adnexal tenderness, and uterine tenderness. Cusco speculum was then introduced to visualize the cervix and end cervical swab was obtained and sent for bacteriological examination. This was done by a gynecologist who is a member of our team.
(2) Ask the patients about symptoms of PID as: pelvic pain, itching, and discharge.
(3) Pretreatment pain index assessment through the visual analog scale (VAS) was used for the assessment of pelvic pain [8,10]. It is a scale, using a 10-cm line divided into 10 equal sections, with 0 representing 'no pain' and 10 representing 'unbearable pain'. Each participant was asked to indicate on the scale the level of pain in their lower abdominal and pelvic region.
(4) Diagnostic ultrasound: was performed before and after the treatment to detect any pathology including adnexal mass, dilated tube, and fluid in the pouch of Douglass and the improvement of the case after treatment.

Laboratory measures

(1) Pretreatment (endocervical swab). During the pelvic examination, specimens were obtained from the endocervix and the vagina (posterior

fornix and sidewall) and placed in separate tubes of normal saline. Each specimen was examined for the number of WBCs.
(2) Erythrocyte sedimentation rate, C-reactive protein.

The patients were divided into three groups (20 patients in each group) according to the following:

(1) First group (group 1): received both medical treatment+physical treatment.
(2) Second group (group 2): received only physical treatment.
(3) Third group (group 3): received only medical treatment.

Patients for SWD groups (group 1 and group 2) were screened for all the contraindications to SWD through the past medical and family history. A thermal skin sensation test was carried out.

Physical treatment procedure

A continuous SWD current was generated by the shortwave diathermy machine (CURAPULS 970; Enraf-Nonius, The Netherlands) adopting the modified crossfire technique as described by Lamina *et al.* [5]. This involved moving electrodes to a position at right angles to their previous position halfway through treatment. In this way, half the treatment was given anteroposteriorly through the pelvis with the patients in supine lying position and second half with the patients in the side lying positions with their legs curled up and the electrodes over the pelvic outlets and the lumbosacral area of the spine. An intensity that generated moderate pleasant sensation of warmth (dose III) in the Kloth definitions of dosage for SWD was used [11].

Treatment was given every alternative day for a total of 15 exposures treatment sessions. The treatment duration was 20 min split into two sessions of 10 min per session in the crossfire positions [12].

Medical treatment

Antibiotics: oral doxycycline 100 mg twice daily and metronidazole 500 mg twice daily for 14 days according to the 2015 Sexually Transmitted Disease treatment guidelines [9].

Post-treatment procedure

At the end of the 14-day treatment duration for the medical group and 5-week treatment duration for physical and combined groups all participants were assessed for:

(1) Post-treatment pain score (VAS) using the same pretreatment procedure [8,10].
(2) Post-treatment laboratory (end cervical swab): each specimen was examined for the number of WBCs compared with previous results before treatment.
(3) Post-treatment US: to detect the improvement of previous pathology.
(4) Post-treatment symptoms of PID regarding pain, itching, and discharge.

The data collected were tabulated and analyzed by SPSS (the statistical package for the social sciences software) statistical package version 16 on IBM compatible computer (IBM Corporation, and is one of the brands under IBM Software Group's Business Analytics Portfolio, Chicago, USA). Two types of statistics were done: descriptive statistics included percentage, mean, and SD and analytical statistics: Student's *t*-test, χ^2-test. *P* value nonsignificant if *P* greater than 0.05, significant difference if *P* less than 0.05, and highly significant difference if *P* less than 0.001 [13].

Results

The study group was homogenous and matched as there was no significant difference among patients of the study groups regarding age, Body Mass Index (BMI) and disease duration as shown in Table 1 and Fig. 1.

There was highly statistical significant clinical improvement regarding itching, discharge and pain relief in the first group of patients with PID compared to the baseline and compared to other groups as illusterated in Table 2 and Fig. 2.

There was highly statistical significant pain reduction regarding VAS in the first and second groups compared to the baseline and compared to the third group with more improvement of the first group and as shown in Table 3 and Fig. 3.

Table 1 Demographic data among the study groups

Treatment	Study groups (mean±SD)			*F* test	*P* value
	Group 1 (*N*=20)	Group 2 (*N*=20)	Group 3 (*N*=20)		
Age	39.6±6.2	33.9±5.8	33.1±6.9	3.2	0.56 (NS)
Disease duration	2.8±1.8	2.95±2.2	2.76±1.9	2.88	0.62 (NS)
BMI	23.52±3.2	25.96±3.7	24.22±3.20	3,54	0.062 (NS)

This table shows insignificant differences regarding age, disease duration, and BMI among the studied groups.

Table 2 Complains of patients of the study groups before and after treatment

Treatment	Study groups [*n* (%)]			χ^2	*P* value
	Group 1 (*N*=20)	Group 2 (*N*=20)	Group 3 (*N*=20)		
Itching					
Pretreatment					
Present	13 (65)	16 (80)	14 (70)	6.88	0.02 (S)
Post-treatment					
Releaved	11 (55)	3 (15)	3 (15)		
χ^2	19.1	3.3	3.4		
P value	0.001 (HS)	0.19 (NS)	0.18 (NS)		
Discharge					
Pretreatment					
Present	13 (65)	13 (65)	8 (40)	4.44	0.01 (HS)
Post-treatment					
Releaved	11 (55)	5 (25)	2 (10)		
χ^2	19.1	5.1	2.3		
P value	0.001 (HS)	0.54 (NS)	0.32 (NS)		
Pain					
Pretreatment					
Present	15 (75)	12 (60)	10 (50)	9.2	0.06 (NS)
Post-treatment					
Releaved	11 (55)	6 (30)	4 (20)		
χ^2	17.4	8	5.1		
P value	0.001 (HS)	0.051 (NS)	0.08 (NS)		

This table shows highly significant difference regarding itching, discharge, and pain before and after treatment in group 1 and insignificant differences in the two other groups. HS, highly significant.

Table 3 Visual analog scale of patients of the study groups before and after treatment

VAS	Group 1	Group 2	Group 3
Pretreatment	58.0±15.49	69.0±11.97	61.3±12.46
Post-treatment	15.0±7.07	42.33±4.95	36.8±14.07
t-Test	23.35	3.2	4.45
P value	0.000 (HS)	0.06 (NS)	0.054 (NS)

This table shows highly significant difference regarding visual analog scale before and after treatment in group 1 and insignificant differences in the two other groups. HS, highly significant; VAS, visual analog scale.

Table 4 Number of pus cells regarding cervical swab in patients of the study groups before and after treatment

Cervical swab	Group 1	Group 2	Group 3
Pretreatment	36.1±7.81	52.0±16.19	43.75±14.1
Post-treatment	7.6±5.27	45.3±12.3	38.42±8.71
t-Test	24.66	8.5	9.32
P value	0.000 (HS)	0.053 (NS)	0.063 (NS)

This table shows highly significant difference regarding the number of pus cells in cervical swab before and after treatment in group 1 with insignificant differences in the two other groups. HS, highly significant.

Table 5 Ultrasound measures in patients of the study groups before and after treatment

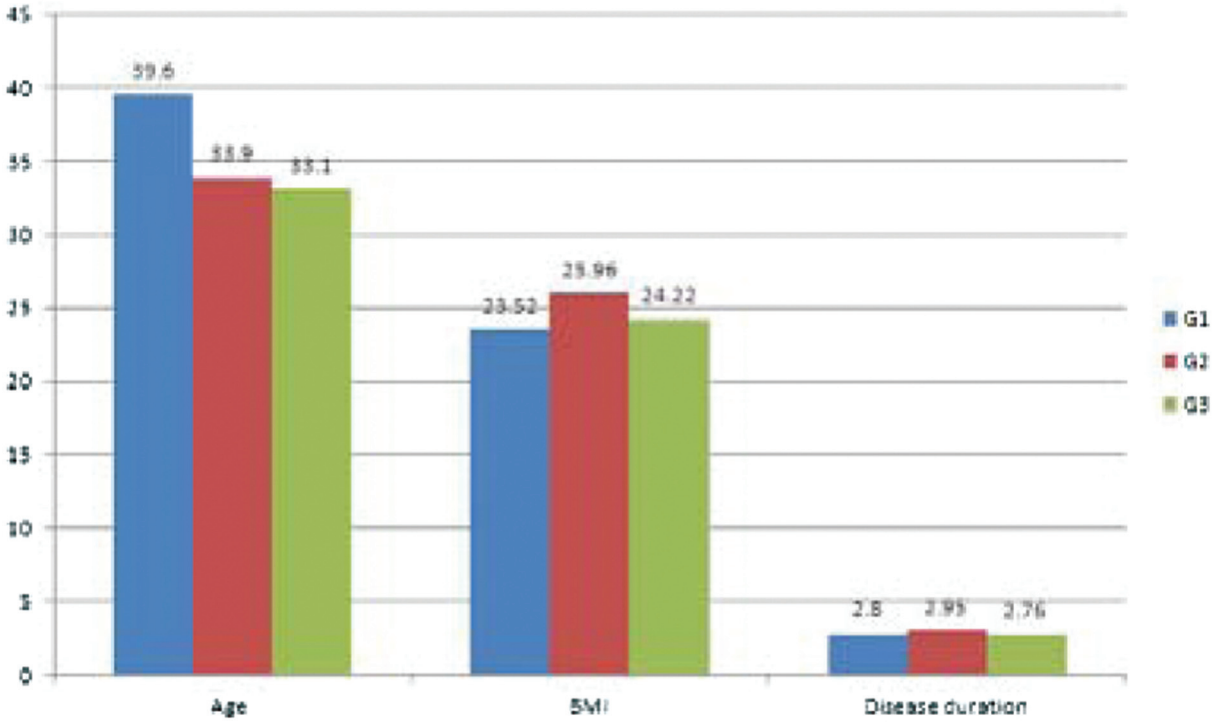
Ultrasound measures	Study groups [*n* (%)]		
	Group 1 (*N*=20)	Group 2 (*N*=20)	Group 3 (*N*=20)
Pretreatment			
Normal	6 (30)	10 (50)	12 (60)
Fluid in the Douglas pouch	14 (70)	10 (50)	8 (40)
Post-treatment			
Improved	14 (100)	3 (30)	5 (62.5)
Not improved	0 (0)	7 (70)	3 (37.5)
χ^2	13.6	4.22	5.09
P value	0.001 (HS)	0.068 (NS)	0.052 (NS)

This table shows highly significant difference regarding the ultrasound measures before and after treatment in group 1 with insignificant differences in the two other groups. HS, highly significant.

There was highly statistical significant laboratory improvement regarding reduction of number of pus cells in the cervical swab in the first group of patients compared to the baseline, and to other groups as in Table 4 and Fig. 4.

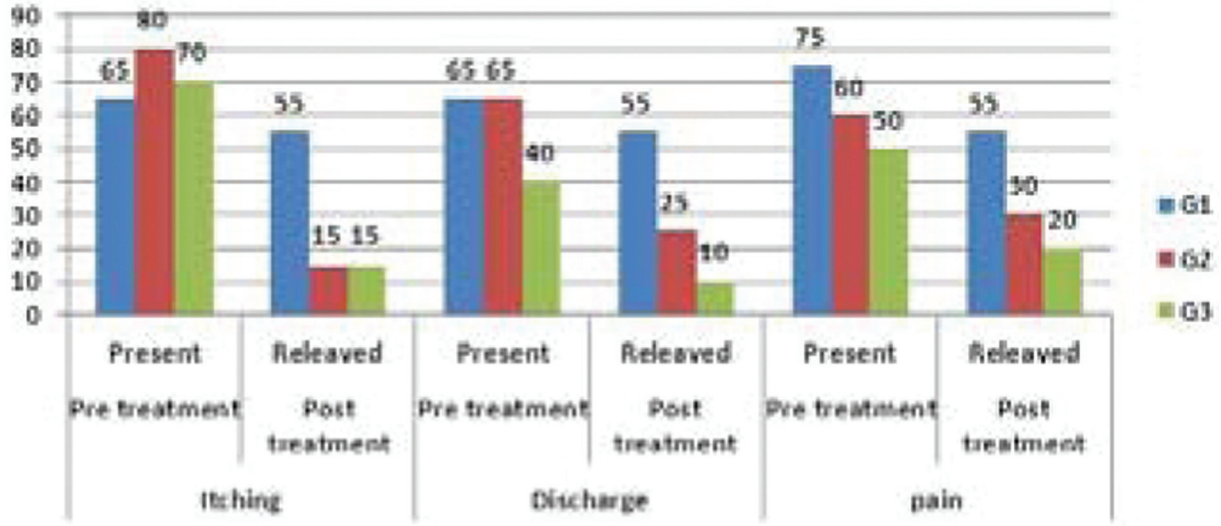
There was highly statistical significant radiological improvement regarding reduction of fluid in Douglas pouch as a parameter of US study in the first group of patients compared to the baseline, and to other groups as in Table 5 and Fig. 5.

Figure 1



Graph 1 shows insignificant differences regarding age, disease duration, and BMI among the studied groups.

Figure 2



Graph 2 shows highly significant difference regarding itching, discharge, and pain before and after treatment in group 1 and insignificant differences in the two other groups.

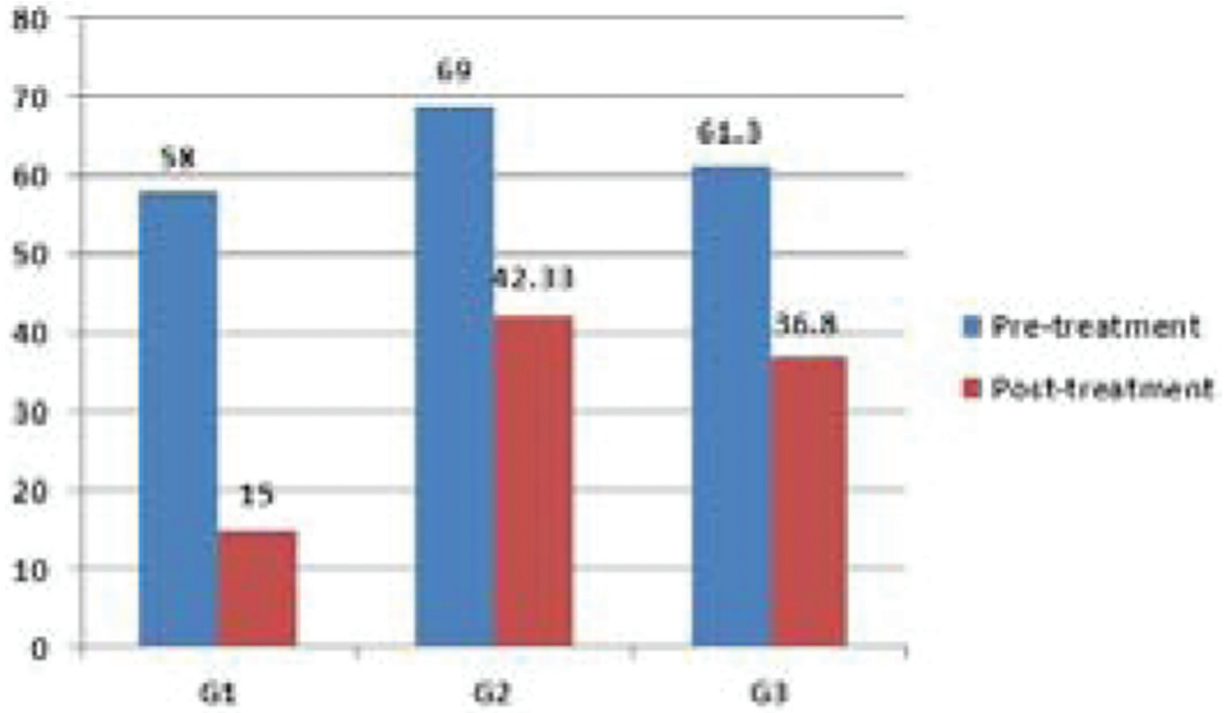
Discussion

The main purpose of this study was to assess the therapeutic efficacy of combined SWD and medical treatment in the management of chronic PID in comparison to either therapy alone.

The statistically highly significant improvement of clinical symptoms regarding itching, discharge, and pain relief was observed in the first group of patients with PID who received a combined medical and physical treatment therapy compared with other groups and compared with the baseline.

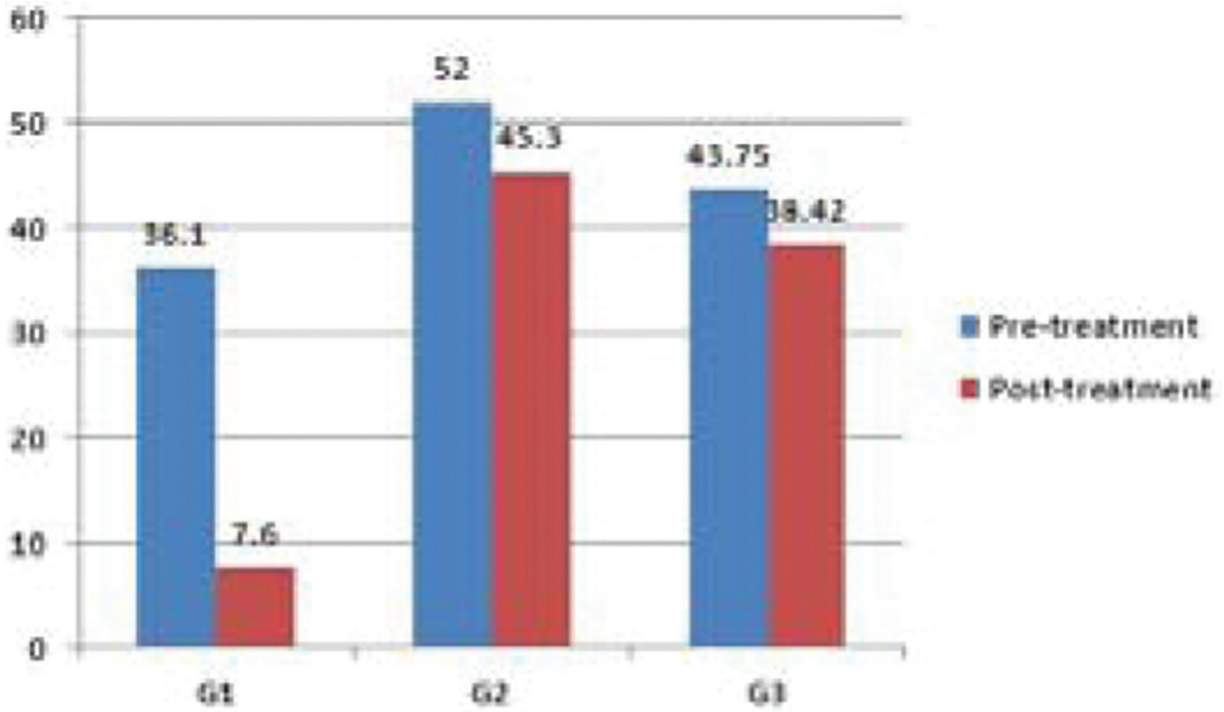
This comes in agreement with Lamina *et al.* [5] who reported a statistically significant improvement of pain and inflammatory signs and symptoms in the group of patients who received combined antibiotics and SWD compared with baseline and compared with other groups.

Figure 3



Graph 3 shows highly significant difference regarding visual analog scale before and after treatment in group 1 and insignificant differences in the two other groups.

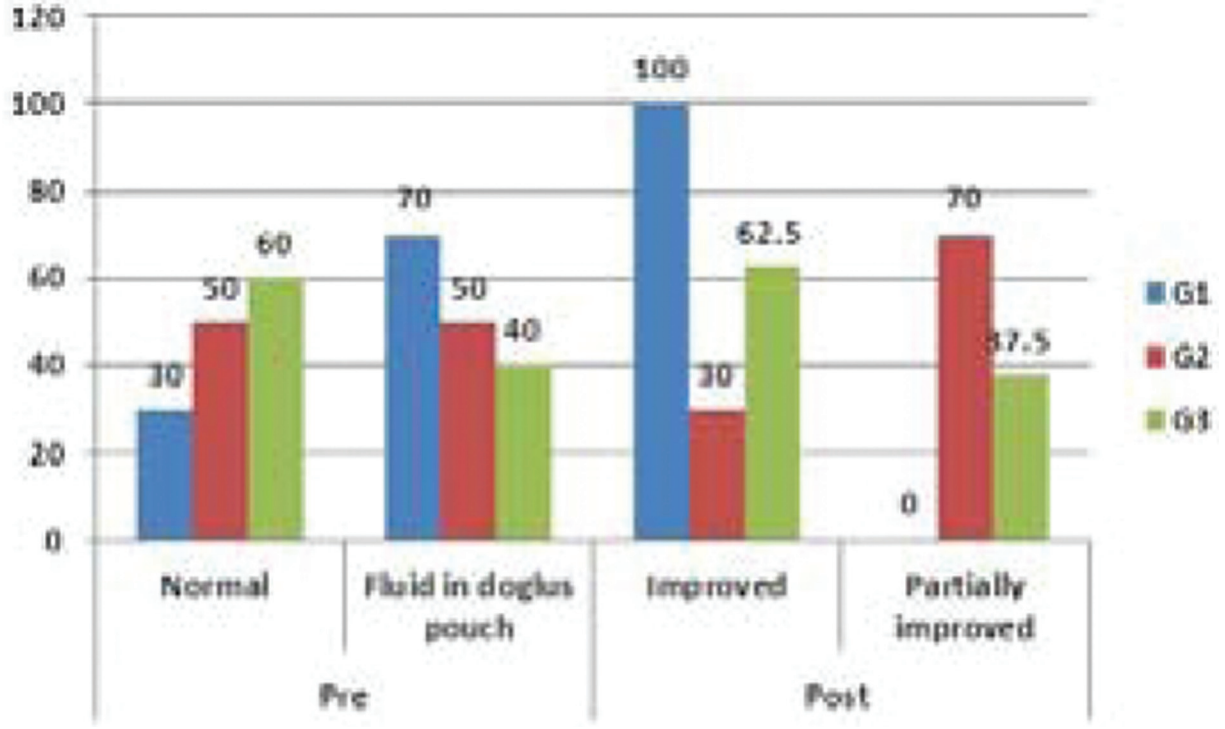
Figure 4



Graph 4 shows highly significant difference regarding the number of pus cells in cervical swab before and after treatment in group 1 with insignificant differences in the two other groups.

Our study observed a statistically highly significant reduction of pelvic pain regarding VAS in the first (combined therapy) and second (physical treatment only) groups of patients compared with the baseline and compared with the third group with more improvement of the first group.

Figure 5



Graph 5 shows highly significant difference regarding the ultrasound measures before and after treatment in group 1 with insignificant differences in the two other groups.

This points to the synergistic effects of the combined therapy in reduction of pain and improvement of inflammatory symptoms which is explained by the therapeutic benefits of medical treatment in attacking the causative microorganisms and the physiological effects of physical treatment (SWD) regarding improvement of circulation with subsequent delivery of oxygen and removal of the metabolic waste products of the involved organs and regarding the sedative and comfortable effects of deep heat radiation to those tissues.

In accordance with our results Sonali *et al.* [14] reported the superiority of SWD over medical treatment (antibiotics and analgesics) in the management of chronic PID and also Balogun and Okonofua [15] reported a significant improvement of pain regarding VAS in a group of patients with PID who received SWD compared with those who received medical treatment.

Evseeva *et al.* [4] also reported that SWD produced marked and long-term positive effects (≥18 months) on pain relief compared with medical treatment.

In the same way, the Lamina *et al.* [5] study reported significant effects of combined medical and physical treatment over medical treatment (analgesic and antibiotic) in pain responses and resolution of inflammation in PID patients.

Further evaluation of patients of the study groups regarding our aim of study we reported a statistically highly significant reduction in the number of pus cells in the cervical swab in the first group of patients compared with other groups and compared with the baseline.

This explains the greatest therapeutic value of combined medical (regarding its pharmacologic effects on microorganisms and its antiseptic properties) and physical treatment (regarding its anti-inflammatory and vascular enhancement effects) in reducing the number of pus cells and minimizing inflammatory cells as WBCs compared with physical therapy alone without the antiseptic effects of medical treatment and medical therapy alone without the vascular enhancement effects of physical treatment.

Lamina *et al.* [5] reported similar results in their study as they observed a significant reduction in the number of pus cells number after treatment with combined physical and medical treatment of chronic PID compared with baseline and over other groups.

Finally as regards radiological assessment there was a highly statistically significant improvement and reduction of fluid in the pouch of Douglas as a parameter of US study in the first group of patients

compared with other groups and compared with the baseline, owing to the combined antiseptic, anti-inflammatory, and vascular enhancement effects of physical and medical treatment which is in agreement with Lamina *et al.* [5] as their study supported the anti-inflammatory effects of combined medical and physical treatment in cases of chronic PID.

Conclusion

We conclude from the present study the greatest therapeutic efficacy of combined physical and medical treatment compared with each line alone in the management of pain and other inflammatory symptoms and in the prevention of complications in chronic PID patients.

Our study was met by some limitations as the small number of patients of the study groups and long time of their collection that caused by exclusion of PID patients with intrauterine device which is the most common cause of infection in women; also, the compliance of the patients to treatment was not very well and some patients were missed after receiving the half number of sessions; so, we exclude the patients who have not received proper treatment as mentioned in participants and methods of this article and this limited the number of our patients.

Recommendation

We recommend studying the therapeutic efficacy of other physical modalities such as magna-therapy and hydrotherapy and other forms of superficial heat therapy in the treatment of chronic PID as infrared regarding their physiological effects in the management of pain and inflammation and regarding their wide range of safety with less limitation of their applications compared with SWD.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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