

Aim: Pulsed electromagnetic field (PEMF) therapy, renowned for its immunomodulatory effects and established efficacy in orthopedics, shows promise for managing peri-implantitis by reducing soft tissue inflammation and marginal bone loss. This study aimed to compare the long-term clinical and radiographic outcomes of non- surgical peri-implantitis treatment with and without PEMF therapy.

Method: Thirty-one patients, with a total of 45 implants displaying peri-implantitis diagnosed with pocket probing depths (PPD) of 6-8mm with bleeding on probing (BoP%) and crestal bone loss ranging from 3-5 mm, was completed this multicenter study. A novel healing abutment integrating active (15 test) or inactive (19 control) PEMF was employed, delivering PEMF at an exposure ratio of 1/500 – 1/5000, intensity: 0.05-0.5 mT, and frequency: 10-50 kHz for 30 days. Non-surgical mechanical debridement of implant surfaces was conducted before abutment placement. Patients were evaluated at baseline (T0), 3 months (T1), and 12-24 months (T2), assessing plaque index (PI), bleeding on probing (BoP), pocket depth (PD), recession (REC), suppuration (SUP), and radiographically measured vertical bone loss (VBL).

Results

Figure 1: Flow chart of patients and implants analyzed

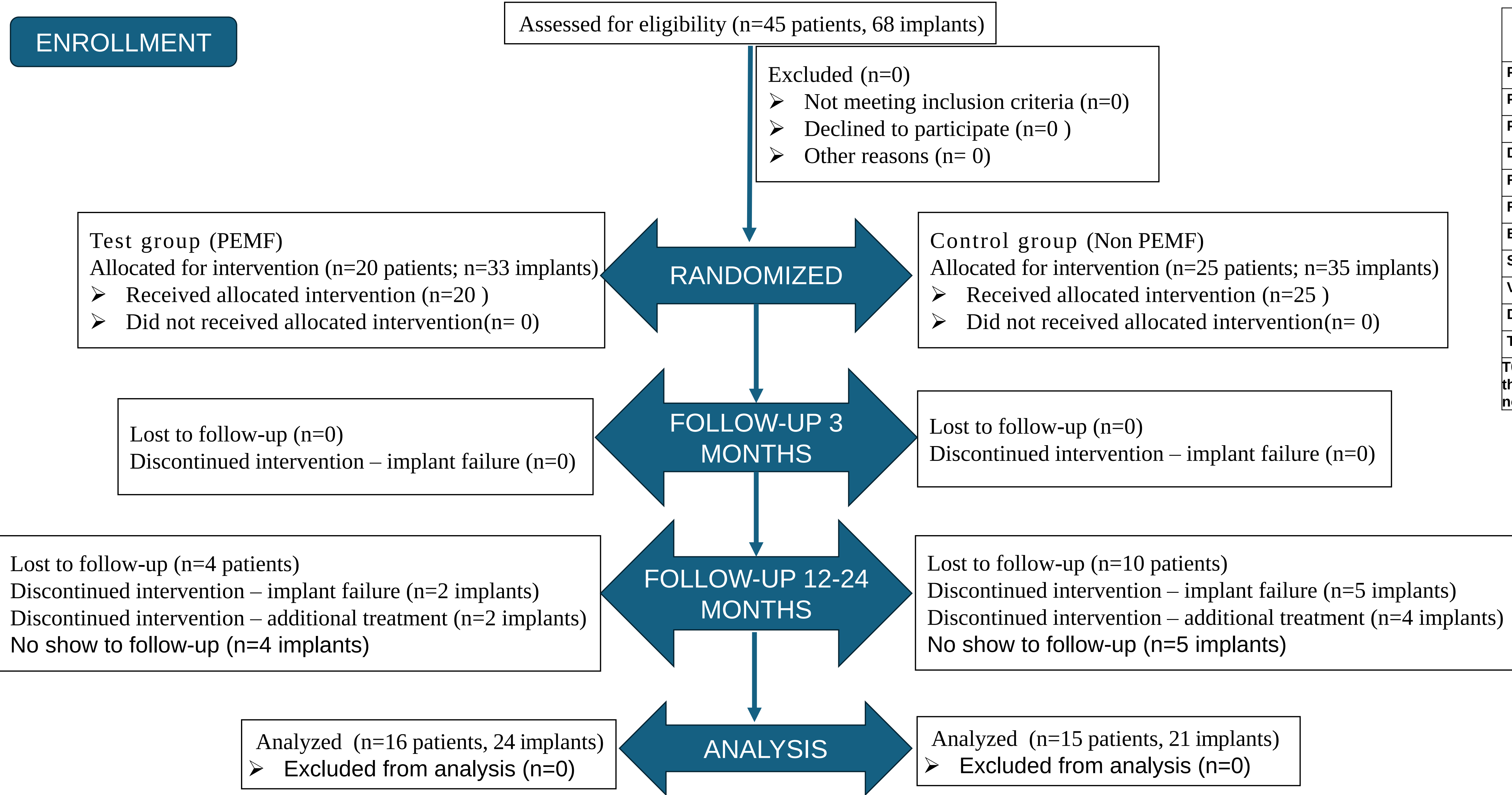


Table: Clinical parameters (mean ± SD) of test sites (i) and six implant sites (ii) in the control group (n = 21 implants) and PEMF experimental group (n = 24 implants) during the evaluation period

Clinical Parameter	All Implants	Control Group			PEMF Test Group		
		T0	T2	T3	T0	T2	T3
PI (%)	100	100	56 ± 50.0	44 ± 50.0*	100	20 ± 32*	0 [#]
PD <i>i</i> (mm)	7.1 ±1.30	7.1 ± 0.90	5.3 ± 1.3	5.1 ± 1.7	7.1 ± 1.5	5.4 ± 2.2	4.4 ± 0.79*
PD <i>ii</i> (mm)	5.5 ± 1.13	6.0 ± 1.4	4.6 ± 1.0	4.5 ± 0.49*	5.3 ± 1.3	4.1 ± 1.7	3.7 ± 1.2*
DPD <i>i</i> (mm)	–	–	–	2.0 ± 1.9	–	–	2.7 ± 0.71
Rec <i>i</i> (mm)	0.09 ± 0.29	0.0	0.03 ± 0.7	0.0	0.09 ± 0.24	0.09 ± 0.16	0.83 ±1.6
Rec <i>ii</i> (mm)	0.06 ± 0.21	0.0 ± 0.36	0.17 ± 0.53	0.33 ± 1.2	0.14 ± 0.36	0.14 ± 0.53	0.67 ± 1.2
BoP (%)	100	100	97 ± 7.6	97 ± 7.6	100	49 ± 45	17.1 ± 19 [#]
Sup (%)	20 ± 23.0	30 ± 27	10 ± 22	10 ± 22	16 ± 21	5.5 ± 12	0 [#]
VBL (mm)		3.63±1.55	3.75±1.53	3.10± 1.63	2.84±1.14	2.39±1.02	3.19±1.14
DVBL T0-T3 (mm)	–	–	–	-0.3 ± 0.11	–	–	0.2 ± 0.4
Treatment Success (%)	–	–	–	50	–	–	71.42

T0: pretreatment baseline; T2: 90 days post-treatment; T3: 12-24 months post-treatment; PI: plaque index; PD: probing depth; Rec: recession; BoP: bleeding on probing; Sup, suppuration; VBL: vertical Bone loss; i: data relative to the test site – probing pocket depth at the deepest site; ii: data relative to the mean of 6 sites evaluated per implant; treatment success: number and percentage of implants which achieve clinical endpoint for treatment (PD< 5 mm, no BoP, and no bone loss). Wilcoxon Test, *p < 0.05 vs. T 0; Mann-Whitney U Test, *p < 0.05 experimental vs. control group

Figure 2: The distance from the implant shoulder to bone crest in a patient from the control group. 1, measurements taken at baseline; 2, measurements taken at 1 month; 3, measurement taken at 3 months 4, taken at 24 months

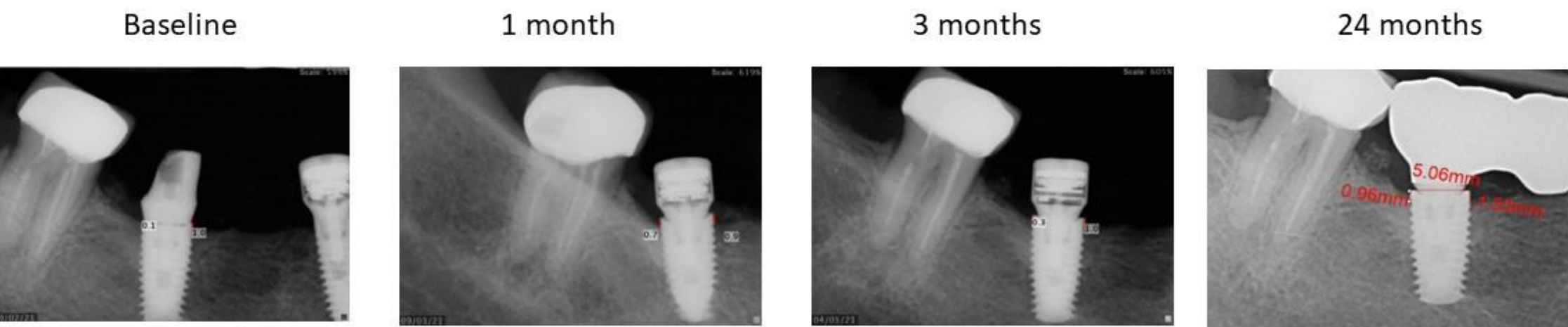
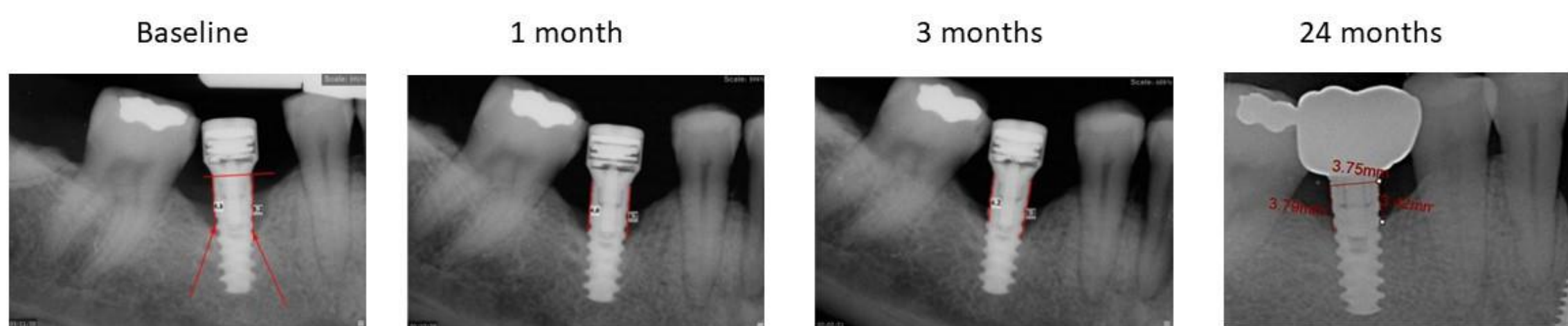


Figure 3: The distance from the implant shoulder to bone crest in a patient from the testl group. 1, measurements taken at baseline; 2, measurements taken at 1 month; 3, measurement taken at 3 months 4, taken at 24 months



Conclusion

These findings suggest that focused PEMF therapy could offer a nonsurgical solution for periimplantitis, capable of achieving clinical goals. Nevertheless, larger samples and longer follow-ups are needed to understand its long-term benefits and limitations.