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Original Research Article

Evaluation of efficacy of CO_2 fractional laser in genitourinary syndrome in menopausal women: a prospective observational study

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ABSTRACT

Background: Objective were to evaluate the efficacy of fractional CO_2 laser in treating genitourinary syndrome (GSM).
Methods: We did a prospective observational study on 92 post-menopausal women aged 37-84 years during December 2022-December 2023 in a private clinic of district Kanpur. Fractional CO_2 laser (Rosch, vaginal 360^0 probe) in three sittings were done for women presenting with GSM at the interval of four weeks as a lunch break therapy. The outcome was studied in terms of visual analogue scale (VAS) having 0 to 10 rating at second, third and sixth months. The statistical analysis was performed using MS excel and GraphPad online statistical calculator.
Results: Stress urinary incontinence, early prolapse, urinary incontinence was the commonest presenting complaints among females. Significant improvement was observed in VAS score in each follow up.
Conclusions: The vaginal fractional CO_2 laser can be used as an effective and safe treatment method in GSM. It is necessary to conduct studies with long-term follow-up.

Keywords: CO_2 Fractional laser, GSM, Menopausal women, VAS

INTRODUCTION

Genitourinary syndrome of menopause (GSM) is a common complaint in post -menopausal women affecting the quality of life to a lot extent. This occurs due to estrogen deficiency. GSM affects 10-40% of postmenopausal women and only very small proportion of women report to doctors due to ignorance or unwanted acceptance to these postmenopausal problems. This has a large impact on quality of life and still underdiagnosed and undertreated.[1] According to the vulvovaginal atrophy terminology consensus conference panel, GSM is considered an accurate term for VVA and includes genital symptoms, sexual symptoms due to lack of lubrication, discomfort or pain, and impaired function and urinary symptoms of urgency, dysuria, and recurrent urinary tract infections.[2] The life expectancy has increased now a days and with ageing the hypoestrogenism worsens and so are the symptoms of GSM become prevalent and many women do complain about these problems. Therapeutic options available for treatment of these symptoms are hormonal and non-hormonal methods amongst which estrogen therapy is the most effective treatment for moderate to severe symptoms.[3] Laser therapy has been included recently and emerged out as an effective way to manage this.[4] The lasers had been already a safe entity to treat diseases in various parts of the body, including skin of the face, neck and chest, as well as the mouth.[5] The CO_2 laser uses a wavelength having high water absorption, of (10,600 nm), to ablate and coagulate vaginal and vulvar tissues.[6] Following thermal ablation by CO_2 laser, tissue remodelling occurs in the form of nucleogenesis as well as neo angiogenesis and hence gain of the vaginal strength.[7,8]

METHODS

This prospective observational study was done among postmenopausal women presenting to the clinic with symptoms of the GSM-vulvovaginal atrophy, sexual problems or urinary problems including women aged 37 to 84 years during December 2022 to December 2023. We excluded females with any psychiatric illness affecting the outcome of study, taking any other hormonal treatment, any previous vaginal reconstructive surgery, previous bone surgery or having implants, prolapse uterus more than second degree from our study. Fractional CO_2 laser by Rosch was given with 360-degree probe, twice from inside to outside. While coming outside the wattage of shots was decreased. A total of 92 participants were enrolled in the study-53 in first group (age <50 years) and 39 in second group (age >50 years). VAS scoring was done before each therapy and at 2 months, 3 months and 6 months interval.

Study protocol was approved by hospital ethics committee, and informed written consent was obtained from each study subjects. Strict confidentially was ensured.

The data was entered and analysed using MS excel. Man-Whitney U test and Wilcoxon signed rank test were used for testing significance using GraphPad online statistical calculator. P<0.05 was considered as significant.

RESULTS

There were 53 patients enrolled in age <50 years (group A) and 39 were enrolled in group with age more than 50 years (group B). The mean age was 44.3 years, BMI 26, maximum 49.1% were second para, 20.8% women suffered hypertension and 31% had diabetes and in group B the mean age was 60.5 years, mean BMI 27.2, with maximum 41% having two children, 61.5% had diabetes mellitus and 48.7% had hypertension. There was significant improvement in VAS score at each follow up overall and in both age groups (Table 2). At 2 months-VAS score between age group <50 years and >50 years (p=0.913-not significant), 3 month-VAS score between age group <50 years and >50 years (p=0.007-significant) and at 6 month-VAS score between age group <50 years and >50 years (p=0.081-not significant). Dyspareunia was the least complained about in both groups, 5.7 and 15.4% respectively. None of patient reported any complication except slight brownish discharge in 1st week after therapy.

Table 1: Profile of study participants, (n=92).

Variables	<50 years, n (%)	>50 years, n (%)	Total, n (%)
Age (in years), mean (SD)	44.3 (4.4)	60.5 (8.8)	51.2 (10.4)
BMI (kg/m^2), mean (SD)	26.09 (2.5)	27.2 (2.5)	26.5 (2.5)
Age (in years), median (range)	44 (16)	58 (32)	49.5 (49)
BMI (kg/m^2), median (range)	26 (12)	27 (10)	27.0 (12)
Age (in years)			
<50	-	-	53 (57.6)
>50	-	-	39 (42.4)
Parity			
1	6 (11.3)	0	6 (6.5)
2	26 (49.1)	10 (25.6)	36 (39.1)
3	13 (24.5)	16 (41.0)	29 (31.5)
4	7 (13.2)	6 (15.4)	13 (14.1)
5	1 (1.9)	5 (12.8)	6 (6.5)
6	0	2 (5.1)	2 (2.2)
Co-morbidities			
Diabetes mellitus			
No	31 (58.5)	15 (38.5)	46 (50.0)
Yes	22 (41.5)	24 (61.5)	46 (50.0)
Hypertension			
No	42 (79.2)	20 (51.3)	62 (67.4)
Yes	11 (20.8)	19 (48.7)	30 (32.6)
Presenting complaints			
Stress urinary incontinence (SUI)			
No	33 (62.3)	26 (66.7)	59 (64.1)
Yes	20 (37.7)	13 (33.3)	33 (35.9)
Early prolapse (EP)			
No	41 (77.4)	25 (64.1)	66 (71.7)
Yes	12 (22.6)	14 (35.9)	26 (28.3)
Dyspareunia			
No	50 (94.3)	33 (84.6)	83 (90.2)

Continued.

Variables	<50 years, n (%)	>50 years, n (%)	Total, n (%)
Yes	3 (5.7)	6 (15.4)	9 (9.8)
Itching			
No	51 (96.2)	36 (92.3)	87 (94.6)
Yes	2 (3.8)	3 (7.7)	5 (5.4)
Chronic discharge			
No	41 (77.4)	34 (87.2)	75 (81.5)
Yes	12 (22.6)	5 (12.8)	17 (18.5)
Urinary incontinence (UI)			
No	45 (84.9)	25 (64.1)	70 (76.1)
Yes	8 (15.1)	14 (35.9)	22 (23.9)
Dryness			
No	47 (88.7)	28 (71.8)	75 (81.5)
Yes	6 (11.3)	11 (28.2)	17 (18.5)
Loose vagina			
No	51 (96.2)	37 (94.9)	88 (95.7)
Yes	2 (3.8)	2 (5.1)	4 (4.3)
Dysuria			
No	50 (94.3)	37 (94.9)	87 (94.6)
Yes	3 (5.7)	2 (5.1)	5 (5.4)
Frequent urination			
No	51 (96.2)	38 (97.4)	89 (96.7)
Yes	2 (3.8)	1 (2.6)	3 (3.3)
Overactive bladder (OAB)			
No	49 (92.5)	39 (100)	88 (95.7)
Yes	4 (7.5)	0 (0)	4 (4.3)
Sexual dysfunction (SD)			
No	48 (90.6)	39 (100)	87 (94.6)
Yes	5 (9.4)	0 (0)	5 (5.4)

Table 2: Efficacy of CO_2 laser in study participants, (n=92).

S. no.	<50 years, n (%)			>50 years, n (%)			Total, n (%)		
	VAS 2 months	VAS 3 months	VAS 6 months	VAS 2 months	VAS 3 months	VAS 6 months	VAS 2 months	VAS 3 months	VAS 6 months
0	0	10 (18.9)	27 (50.9)	0	1 (2.6)	15 (38.5)	0	11 (12)	42 (45.7)
1	0	12 (12.6)	20 (37.7)	0	6 (15.4)	13 (33.3)	0	18 (19.6)	33 (35.9)
2	1 (1.9)	15 (28.3)	5 (9.4)	0	13 (33.3)	8 (20.5)	1 (1.1)	28 (30.4)	13 (14.1)
3	6 (11.3)	11 (20.8)	1 (1.9)	2 (5.1)	10 (25.6)	1 (2.6)	8 (8.7)	21 (22.8)	2 (2.2)
4	12 (22.6)	4 (7.5)	0	10 (25.6)	6 (15.4)	1 (2.6)	22 (23.9)	10 (10.9)	1 (1.1)
5	13 (24.5)	1 (1.9)	0	12 (30.8)	3 (7.7)	1 (2.6)	25 (27.2)	4 (4.3)	1 (1.1)
6	10 (18.9)	0	0	9 (23.1)	0	0	19 (20.7)	0	0
7	6 (11.3)	0	0	6 (15.4)	0	0	12 (13)	0	0
8	5 (9.4)	0	0	0	0	0	5 (5.4)	0	0
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0

DISCUSSION

Before the use of laser therapy, the local estrogen therapy was the only effective method to treat GSM but the compliance used to be not good due to the fear of side effects. CO_2 laser therapy was first introduced in 2014 and since then CO_2 lasers had been a well-established therapeutic modality in the field of dermatology for various indications and later in other medical fields also.[9,10] The mode of action of fractional CO_2 laser is based on the production of heat by vaporization of water present in the cells of deeper lamina propria. The energy of the laser is precisely directed to avoid damage to the surrounding tissues while giving focussed hyper-regulated injury leading to neo-angiogenesis and neocollagenesis.[11]

As reported by Zerbinati et al CO_2 laser therapy restores the thick vaginal epithelial lining, increased collagen and ground substance in the lamina propria and increases the vascular supply of the tissue and hence alter the severity of GSM as also shown in our cases by improved VAS scoring at two, three and six months of follow up.[12] Perino

et al mentioned collagen tightening induced by three passes of CO_2 laser persisted at 6 months after the procedure as shown in our study in gaining sexual satisfaction in both partners better than before.[13] The thinned out vaginal epithelium due to estrogen deficiency gets regenerative effects of collagen remodelling in the genitourinary tract enhancing the tissue quality. The pH of the vaginal epithelium is restored by liberation of glycogen and acidic mucins from the epithelium with decreased itching and dyspareunia and dysuria. Sokol et al demonstrated significant improvement in GSM symptoms in postmenopausal women as also observed improvement of GSM symptoms in our study group with significant $p<0.05$ who underwent three sessions of fractional CO_2 laser vaginal treatment.[14,15] Relevant urinary and sexual symptoms improved comparatively same in both age groups of <50 years and >50 years age group. Findings were significant ($p<0.05$) following three treatments. The postmenopausal population studied here, though limited in sample size, does support that there is improvement in GSM symptoms after consecutive three therapies, but as ageing continues, they may require maintenance therapies in future. The role of CO_2 laser treatment, as a non-hormonal treatment option is a good option to be explored further on a large scale and for a longer period.

CONCLUSION

In our study population, the fractional CO_2 laser treatment showed improvement in GSM symptoms in the postmenopausal women. The positive effect was better associated with lesser age women and had very few improvements in age group above 75 years. Positive response was seen even after the first therapy in the younger age group and in an older group after second or the third therapy. Therapy was convenient to patients as it took very less time and no specific preparations were needed with minimal discomfort. Assessment of long-term post treatment, clinical outcome is needed in future.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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