

Assessment of Interferential Currents Therapy Efficacy in Management of Primary Nocturnal Enuresis in 5-15 Years Old Children: A Randomized Clinical Trial

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Abstract

Introduction: Nocturnal enuresis affects about 15 percent of 5 years old children and because of its social (psychological) problems, it must be treated. Different treatment modalities such as imipramine, desmopressin, bed alarm have been used but applying of new and effective modalities can be an appropriate view. The aim of this study was to compare efficacy of interferential currents (IFC) with nasal spray of desmopressin in treatment of primary nocturnal enuresis of 5-15 years-old children.

Methods: This study was a randomized, clinical trial in which 39 patients with primary nocturnal enuresis received desmopressin (20 µg/day) for 3 weeks and if was responsive, leave off gradually in six months and 36 patients were selected randomly by simple randomization for IFC therapy (5 times /week, 20 minutes / session, up to 15 sessions). Efficacy of treatment was evaluated after accomplishment of therapeutic sessions and recurrence rate was evaluated one month later.

Results: In IFC group, complete response was observed in 25%, partial response in 36.1% and 38.9% had no response. In desmopressin group, response was observed in 87.2%, and 12.8% had no response (Risk ratio =2.4, 95% confidence interval (1.32-4.32)).

The recurrence rate in IFC and desmopressin were 61% and 87.2%, respectively. Therapeutic side effects were not observed in any of patients (Risk Ratio=0.7, 95%CI (0.53-0.94)).

Conclusion: Desmopressin and IFC are effective and safe modalities for treatment of primary nocturnal enuresis of children. Although desmopressin has more efficacy but IFC has less recurrence rate.

Keywords: Nocturnal enuresis; Interferential currents; Desmopressin

Introduction

Enuresis is defined as involuntary control of urine in sleep and when it occurs at night it is termed nocturnal enuresis. Approximately 15 -20% of children wet at night at 5 years old and it is 50% more common in boys than in girls [1].

Nocturnal enuresis has spontaneous resolution rates of 15% per year, so that by age 15 it persists in only 1% of the population. Because of its social (psychological) problems for patients and their families, it needs treatment in patients older than 5-6 years of age [1,2].

Management of a child with enuresis should begin with behavioral therapy. Pharmacotherapy for enuresis is second -line treatment and should be reserved for those patients who fail behavior treatment [3]. Although patients with primary enuresis haven't any organic abnormality but Because of its social (psychological) problems for patients and their families, it needs treatment in patients older than 5-6 years old [1,2]. Management of the child with enuresis should begin with behavioral therapy. Pharmacotherapy and use of complementary medicine such as hypnotherapy and faradizations for treatment of enuresis are second -line treatments and should be reserved for those patients who fail behavior treatment [1,3,4]. Desmopressin (DDAVP) is an analogue of vasopressin that can be given intranasal or orally, and its effect lasts for 7 to 12 hours. The usual clinical dose of nasal spray is 20 and 40 microgram per night [1,5]. Unfortunately, the relapse rate upon sudden discontinuation of DDAVP is high and it must be tapered during 4-6 months. DDAVP

is also associated with rare side effects of hypernatremia and water intoxication [3]. Interferential current therapy (IFC) is a modality that utilizes two alternating current signals of slightly different frequency. IFC machines typically use medium-frequency currents of approximately 4000 to 5000 Hz [6]. Alternating currents of medium frequency (1000 to 10000 Hz) have lower skin resistance than low-frequency currents (<1000 Hz) and as a result postulated that they penetrate tissue more easily [4]. IFC is useful in a variety of musculoskeletal and neurological conditions, and in the management of urinary incontinence [5]. A variety of therapeutic benefits can be made by electrically stimulating a muscle contraction that includes: muscle reeducation, muscle pump contractions, retardation of atrophy, muscle strengthening and increase in the range of motion [6]. The aim of this study was to compare effects of interferential currents with nasal spray of desmopressin in primary nocturnal enuresis of 5 to 15 years old children.

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Method

In this registered randomized clinical trial (IRCT No: 138801161323N3) from December 2006 to February 2008, seventy five (75) patients 5-15 years old with primary nocturnal enuresis who were referred to Shahid Mofateh Clinic of Yasuj University of Medical Sciences and had history of at least two times nocturnal bed wetting in one week were studied. Patients with any history of urinary tract infections, diurnal enuresis, organic disease and abnormality of urinary systems and those with resistance to other treatments were excluded. For all of them a history including age, weight, height, medical disease, previous treatments were recorded. Subsequently, physical examination consisting of palpation and neurologic examination of perineum were completed. These data and basic laboratory tests such as urine analysis and urine culture and fasting blood sugar to rule out of organic causes were completed. In this study, after taking informed consent form from their parents and approval of ethic committee of Yasuj University of Medical Sciences, they were assigned in two groups using simple randomization. The variables of this investigation included of independent variable consisting of primary nocturnal enuresis and dependent variables consisting of interferential currents and desmopressin nasal spray administration. In group 1, treatment started by nasal spray of Desmopressin, 2 puffs (20 microgram) per night for 3-4 weeks. If no response was observed, they were considered as unresponsive. In others, the same dose were given for 3-4 months, and then drug tapered gradually within two months and after the 6th month, drug administration was discontinued. One and 6 months later, patients were visited again for recurrence of enuresis. In group 2, patients referred to a physiatrist for interferential current therapy (IFC). After examination, if there were no contraindication for IFC, they were referred to physiotherapist and treatment by IFC was conducted for three weeks, every week five days and every session twenty minutes. In this method, in supine position patient would bend his knees, and by four polar method with two electrodes on both sides of the lower abdomen (below inguinal ligament) and two electrodes on the upper sides of inner thighs, just near origin of abductor muscles of thighs), IFC was done in bladder and sphincter muscles. Frequency of IFC was (IF set made by Novin company, model 520A and program No 43) between 4000-4500 Hertz with intensity current of 15-30 milliamper. At the end of treatment and one and six months later, patients were evaluated for improvements and results compared with pretreatment condition. In both groups, complete improvement of enuresis and reduction of at least fifty percent in wetting nights were considered as complete and relative response, respectively. Absence of any response was considered as unresponsiveness and any increase of wetting time until one month after treatment was considered as recurrence.

Data Analyses

All gathered data was analyzed by SPSS software ver. 11.5 with free license using Chi square and exact Fisher tests for comparison between qualitative ordinal variables.

Results

Seventy five patients had criteria for enrollment in the study (39 patients in group 1 and 36 patients in group 2). Mean age of patients in groups 1 and 2 were respectively 9.30 and 9.03 years old respectively.

Sixty six point seven percent of patients were in the age group 5-10 years old and 33.3 percent were in the age group of 11-15 years old. In desmopressin group, 69.25% and In IFC group, 63.9% of patients were 5-10 years old.

According to response rate, complete response was 61.5% and 25% in desmopressin and IFC groups respectively. Relative response was developed in 25.6 and 36.1 percent of patients in groups 1 and 2 respectively. Unresponsiveness was observed in 12.8 and 38.9 percent of two groups respectively. Recurrence rate one month after treatment were 23.1 and 16.7 percent in desmopressin and IFC groups respectively.

Response Risk (complete and relative) in desmopressin and IFC groups were estimated equal to 0.61 and 0.26 respectively and risk ratio was estimated equal to 2.4 with 95% confidence interval (1.32-4.32) that statistically was significant ($X^2=9.93$, $df=1$, p -value=0.0019) (Table 1).

Recurrence risk was high in desmopressin group compare to IFC group. This difference statistically was significant in two groups (Risk Ratio=0.7, 95% CI (0.53-0.94)) (Table 2).

Discussion

In this study, prevalence of enuresis in age group of 11 – 15 years was lower than age group of 5 - 10 years, which is in agreement with result of other studies [1,2,7]. Prevalence of enuresis is 15 percent at 5 years old and by increase in the age, prevalence of disease decreased, so as in age 15 years only 1 percent of population may have enuresis [1]. Because enuresis is a disease that may be due to delay in development of urine control, therefore prevalence of disease decreased by increase in age [8]. Prevalence of enuresis in this study were higher in males than females that were correlated with result of previous studies of De grazio et al. [9], Snajderova et al. [10], and Caine et al. [11] Probably, because of the higher rate of stress in males and unknown genetical factors, the prevalence of enuresis is higher in males.

In the Fallahzadeh study, it has been reported that the effect of interferential currents in treatment of enuresis in 40 children 5 to 15 years old (12 set, 3 times per week, 15 minutes, each session) were evaluated by interferential currents [12]. There was secondary enuresis in 8 patients that response to treatment was in 7 of them (1 complete response, 6 relative). In 32 child with primary enuresis, there were 20 treatment responses (5 complete response, 15 relative response). Response to treatment was 62.5 percent. In follow up, the recurrence of enuresis was seen in 6 children. The response to treatment was

	Group	
	Desmopressin	IFC
Response	22	10
Non response	14	29
Total	36	39
Risk	0.61	0.26

Risk Ratio=2.4 95% CI (1.32-4.32)
 $X^2=9.93$ $df=1$ p -value=0.0019

Table 1: Comparison treatment efficacy of IFC and Desmopressin.

	Group	
	IFC	Desmopressin
Recovery	34	22
Non recovery	5	14
Total	39	36
Risk	0.61	0.87

Risk Ratio=0.7 95% CI (0.53-0.94)
 $X^2=6.73$ $df=1$ p -value=0.0095

Table 2: Comparison protection efficacy of IFC and Desmopressin in respect of recurrence of symptom.

not correlated to age [12]. In our study, response rate to treatment (complete and relative) with IFC was 61.1 percent that was correlated with Fallahzadeh study [12] and Apell [13]. In our study, recurrence rate of enuresis after interruption of IFC was 16.7 percent. In Fallahzadeh study [12], the recurrence rate of primary enuresis was unknown. The sessions of treatment in this study was 15 session but in Fallahzadeh study [12] was 12 session. The increased sessions of treatment of IFC were not increase treatment response and were not decrease recurrence rate of enuresis. Thus 10 to 12 session of IFC for treatment of enuresis in children is enough. In our study, rate of recurrence in IFC and desmopressin was lower than Snajderova et al. [10] and Mehrabi S et al. [7]. Rate of recurrence of enuresis was lower in IFC compared to nasal spray of desmopressin. In Desmopressin group, total response was 87.1 percent. One month from post-treatment, recurrence rate of enuresis was 23/1 percent. In the study of Snajderova, response treatment after 6 weeks from termination of treatment was 89.1 percent, after 1, 2, 3 years were 72.7, 75/9 and 61/1 percent respectively [10]. The findings of this study were correlated with Snajderova study [10]. In Mehrabi study [7], complete response to desmopressin was 60 percent, relative response was 34/3 percent and unresponsive was 5.7 percent, that response to treatment was correlated with this study, but recurrence rate was higher than our study. The higher recurrence rate in Mehrabi study [7], probably were be due to selection of patients that were resistant to single treatment modality. Also in study of Montaldo P and his colleagues combination of Desmopressin and oxybutinin in enuretic patients had better response than Desmopressin and placebo [5]. In comparison to a study by Caine P that rate of total response was 41 to 51 percent [11], a weak correlation was reported with result of this study that probably were due to different age domain (7 to 18 years old) and resistance of patients to urinary alarm (most effective treatment of enuresis) [14]. In age group of 11 to 15 years old that were treated with nasal spray of desmopressin, all of them were improved (complete or relative). Probably desmopressin are more effective in older age in primary enuretic patients. All females that were treated with nasal spray of desmopressin had complete response to treatment. From the result of this study it may be concluded that nasal spray of desmopressin is more effective in females with primary enuresis that probably related to hormonal effects. Responses of treatments to IFC and desmopressin were better in age group of 11 - 15 years old in compare to 5 - 10 years old. We conclude that in older children with enuresis, response to treatment was better. This finding may be due to more development of sphincter with increase of age. Total recurrence of IFC and desmopressin were occurred only in males. We conclude that recurrence rate in females was low or zero. This fact may be due to hormonal factors. Complications were not observed in children that treat with IFC and desmopressin. Therefore IFC and desmopressin are safe in treatment of primary enuresis of children. We suggest that future studies for evaluation of effects of IFC with other treatments of primary enuresis and comparison efficacy of IFC in treatment of primary and secondary enuresis that are resistant to other treatments will be carried out with more cases.

Conclusion

According to results of this study, we concluded that while efficacy of desmopressin in treatment of primary enuresis was higher than IFC, but IFC is a cost- efficient and safe modality in treatment of primary enuresis due to low treatment course (three weeks in contrast to 6 months of desmopressin course), low recurrence rate, good responses and absence of complications.

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