Original Research Article

The Impact of Dry Needling on Patients with Neck Pain in a Tertiary Hospital

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Abstract

Neck pain presents as a symptom of dull pain or discomfort mainly along the trapezius muscle. Dry needling is an invasive procedure which uses acupuncture needle directed at myofascial trigger points. The aim of the study was to evaluate the effectiveness of dry needling in managing patients with neck pain. A pre-test-post-test interventional study design was used. Patient education package was provided to 32 respondents who fulfilled the inclusion criteria. A 13-item Pain Catastrophizing Scale (PCS) questionnaire was used to assess Rumination, Magnification and Helplessness. Subjective pain intensity was measured by Visual Analogue Scale (VAS). These questionnaires were given before and after the dry needling intervention. The findings reported that respondents scored high in pre-test total PCS score (27.41 ± 13.652). Post-test result revealed a significant improvement in total PCS score (23.06 ± 13.938) ($p = 0.000$). Post-test VAS score (4.78 ± 1.237) was also significantly better than pre-test (6.47 ± 1.414) ($p = 0.000$). There was no significant difference in pre-test PCS in terms of marital status ($p > 0.05$) whereas there was significant difference between marital status and rumination in post-test ($Z = -2.303$, $p = 0.021$). There was significant difference between pre-test magnification in terms of respondents' occupation ($p = 0.008$) and race ($p = 0.035$) but no significant difference in post-test. Respondents' age group showed no significant differences between pre-test and post-test PCS and VAS ($p > 0.05$). In conclusion, patients who received dry needling showed improvement in pain intensity and catastrophizing towards neck pain.

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Introduction

Neck pain is defined as a symptom of dull pain or discomfort that occurs mainly along the trapezius muscle (1). Neck pain is highly prevalent, 67% of adults experiencing neck pain during some point of their life (2). The prevalence of neck pain increases with age irrespective of sex. The highest prevalence is seen in the 50-59 years age group (3,4). Generally, women are twice as susceptible to neck pain than men (5,6).

Treatment of neck pain is a challenging, practitioners perceive active exercise, transcutaneous electrical nerve stimulation, traction, and ultrasound as effective modalities in the management of neck pain (7,8).

Neck pain is a common condition that affects more than two-thirds of the general population at one point of time during their life. It is a public health condition that is associated with disability (9). Although majority of people affected by neck pain are mildly disabled, about

5-10% of those are troubled with severe disability (2,10). The physical functioning capability of patients can be affected by this disability and this may give rise to restriction of activity and behavioral sickness (11). Neck pain may not cause mortality but the pain and stiffness may cause significant disability and psychologically affect a person's feeling of wellness (12).

Catastrophizing is defined as an exaggerated negative mental set brought to bear during actual or anticipated painful experience (13). There has been many research done showing the multidimensional conceptualization comprising of rumination, magnification, and helplessness (13). Catastrophic thinking is not only associated with increased pain and emotional distress. There is also a significant chance that the pain may be prolonged with disability (14,15). According to Dommerholt et al., trigger point dry needling is practiced around the world by physical therapists as part of their clinical practice and use the technique in combination with other physical therapy interventions for musculoskeletal pain (16) Information pertaining to dry needling treatment of musculoskeletal pain is relatively new and limited. An awareness of dry needling treatment should be shared with patients in order to eliminate their agony of experiencing neck pain. The main aim of this study was to evaluate the effectiveness of dry needling on neck pain patients in a tertiary hospital. Regarding the pain outcome of neck pain patients after dry needling, the tool use in this research was Pain Castastrophizing Scale (PCS) Questionnaire. Besides, another tool that being used was Visual Analogue Scale (VAS). It was used to measure the subjective pain intensity which was crucial as pain can lead to varying degrees of altered behavior and functional disability.

Materials and Methods

A pretest post-test interventional study design was conducted in a tertiary hospital over a period of six months in 2013. Inclusion criteria were patients with neck pain, aged above 18 years of age. Exclusion criteria were patients with coagulopathy and less than 18 years of age. Ethical approval was obtained from the institution's Ethics and Research Committee.

All recruited respondents were given patient education on dry needling therapy. Self administered questionnaires were then provided to the respondents before the procedure. The questionnaire consisted of socio-demographic data, a validated 13-item Pain Catastrophizing Scale (PCS) which was adapted with permission and the subjective pain intensity assessment by Visual Analogue Scale (VAS). Following dry needling therapy, a post-test with the same set of questionnaires was done.

Statistical Analysis

The data was analyzed using Statistical Package for Social Science (SPSS) version 21. The respondents' PCS and VAS score before and after dry needling therapy were both analyzed using Wilcoxon Signed Ranks test to compare the mean ranks as the data was not normally distributed. Relationship between social demographic profiles with pre-test and post-test PCS and VAS score was analyzed by inferential statistics of Kruskal-Wallis and Mann-Whitney test.

Results

A total of 32 patients were recruited. Demographic data was shown in Table 1.

The respondents PCS score before and after dry needling treatments were depicted in Table 2. For rumination, there was a significant difference of score before (mean 9.56 ± 4.295) and after (mean 8.59 ± 4.309) dry needling treatment with ($p = 0.001$, $z = -3.433$). For magnification, there was a significant difference of score before (mean 7.59 ± 3.582) and after (mean 6.00 ± 3.654) dry needling treatment with ($p < 0.001$, $z = -3.864$). For helplessness, there was a significant difference of score before (mean 10.25 ± 10.25) and after (mean 8.47 ± 6.744) dry needling treatment with ($p < 0.001$, $z = -4.520$). For total PCS score, there was a significant difference of score before (mean 27.41 ± 13.652) and after (mean 23.06 ± 13.938) dry needling treatment with ($p < 0.000$, $z = -4.674$).

The score of VAS before and after dry needling therapy revealed a significant difference before (mean 6.47 ± 1.414) and after (mean 4.78 ± 1.237) dry needling therapy ($p < 0.001$, $z = -4.963$) (Table 3).

Table 4 showed respondents' pre- and post-test PCS and VAS with race. There were no significant differences in pretest and post-test total PCS, rumination, and helplessness with race ($p > 0.05$). However, there was significant difference for magnification in pretest ($p = 0.035$). Meanwhile, there was no significant difference in pretest and post-test VAS score with race ($p > 0.05$). Chinese patients werereported to have a higher median for total PCS in pre-test (median = 34.5, IQR = 15), while the median for post-test were equal for both Malay and Chinese patients. RegardingVAS score, the Malay group was reported to have higher median in pretest (median = 7, IQR = 1) and median for post-test were equal for both Malay and Chinese.

Table 1: Socio-Demographic Profile

Characteristic	Variables	Frequency (N)	Percentage (%)
	26-40	5	15.6
Age	41-55	16	50
	56-70	11	34.4
Race	Malay	23	71.9
	Chinese	9	28.1
Marital Status	Single	6	18.8
	Married	26	81.3
	Private	13	40.6
Occupation	Government	9	28.1
	Unemployed	4	12.5
	Retired	6	18.8

Table 2: Respondents' PCS score before and after dry needling intervention.

Variables	Mean ± SD	Mean Rank	Z	P
Ruminant (Pretest)	9.56 ± 4.295	4.50	-3.433	0.001
Ruminant (Post-test)	8.59 ± 4.309	15.79		
Magnification (Pretest)	7.59 ± 3.582	0.00	-3.864	<0.001
Magnification (Post-test)	6.00 ± 3.654	10.00		
Helplessness (Pretest)	10.25 ± 10.25	9.00	-4.520	<0.001
Helplessness (Post-test)	8.47 ± 6.744	17.28		
Total PCS (Pretest)	27.41 ± 13.652	3.50	-4.674	<0.001
Total PCS (Post-test)	23.06 ± 13.938	17.34		

Table 3: Respondents' VAS score before and after intervention

Variables	Mean ± SD	Mean Rank	Z	P
Visual Analog Scale (Pretest)	6.47 ± 1.414	0.00	-4.963	<0.001
Visual Analog Scale (Post-test)	4.78 ± 1.237	16.00		

Table 4: Respondents' pretest and post-test PCS and VAS score with race

	Pretest				Post-test			
	Race (Median(IQR))				Race (Median(IQR))			
Variables	Malay (n=23)	Chinese (n=9)	Z	P value	Malay (n=23)	Chinese (n=9)	Z	P value
PCS	27(28)	28(27)	-1.197	0.231	21(28)	21(31)	-0.525	0.599
-Rumination	10(6)	9(10)	-0.042	0.966	8(9)	7(7)	-0.0231	0.817
-Magnification	8(7)	10(3)	-2.113	0.035*	6(6)	9(8)	-1.052	0.293
-Helplessness	9(14)	8(15)	-0.715	0.475	7(12)	5(15)	-0.882	0.378
VAS	7(1)	6(3)	-0.514	0.607	5(2)	5(2)	-0.172	1.863

Table 5: Respondents' pretest and post-test PCS and VAS score with marital status

Variables	Pretest				Post-test			
	Marital Status (Median(IQR))		Z	P value	Marital Status (Median(IQR))		Z	P value
	Single (n=6)	Married (n=26)			Single (n=6)	Married (n=26)		
PCS	40.5(21)	25(27)	-1.331	0.183	38.5(26)	19.50(25)	-1.670	0.095
-Rumination	14.5(6)	9(8)	-2.131	0.330	15(8)	7(5)	-2.303	0.021*
-Magnification	8.5(5)	9(6)	-0.170	0.865	8.5(7)	6(7)	-0.946	0.344
-Helplessness	17.5(10)	8(14)	-1.284	0.199	14.5(11)	5(12)	-1.427	0.154
VAS	8(3)	6(2)	-1.827	0.068	6(3)	5(1)	-1.788	0.074

Table 6: Respondents' pretest and post-test PCS and VAS score with age group

Variables	Pretest				Post-test			
	Age (Median(IQR))			P value	Age (Median(IQR))			P value
	26-40 (n=5)	41-55 (n=16)	56-70 (n=11)		26-40 (n=5)	41-55 (n=16)	56-70 (n=11)	
PCS	25(21)	31.5(24)	15(30)	0.571	21(22)	24.5(26)	9(28)	0.267
-Rumination	8(7)	11(8)	9(7)	0.669	6(7)	8.5(10)	7(5)	0.455
-Magnification	10(6)	8.5(2)	7(9)	0.330	8(6)	6.5(5)	2(8)	0.160
-Helplessness	8(8)	11.5(12)	3(17)	0.450	6(10)	9.5(11)	2(15)	0.359
VAS	6(5)	6.5(2)	7(2)	0.338	3(4)	5(2)	5(2)	0.677

Table 7: Respondents' pretest and post-test PCS and VAS score with occupation

Variables	Pretest					Post-test				
	Occupation (Median(IQR))				P value	Occupation (Median(IQR))				P value
	Private Sector (n=13)	Government Sector (n=9)	Unemployed (n=4)	Retired (n=6)		Private Sector (n=13)	Government Sector (n=9)	Unemployed (n=4)	Retired (n=6)	
PCS	31(22)	24(25)	32.5(28)	13.5(30)	0.121	24(24)	18(20)	27(29)	8.5(27)	0.298
-Rumination	10(8)	8(8)	11.5(11)	9.5(5)	0.484	8(8)	7(7)	10.5(11)	7(5)	0.417
-Magnification	10(3)	8(6)	9(2)	2.5(9)	0.008*	9(7)	5(4)	8(4)	1.5(8)	0.058
-Helplessness	10(13)	8(11)	12(16)	2.5(16)	0.329	8(14)	5(10)	8.5(14)	1.5(16)	0.259
VAS	6(3)	7(2)	6.5(4)	7(2)	0.635	4(3)	5(2)	4.5(3)	5(1)	0.789

The results of respondents' pre-test and post-test of PCS and VAS with marital status were tabulated in Table 5. There were no significant differences in pre-test and post-test total PCS, magnification, and helplessness with races (p > 0.05). However, there was significant difference for rumination in post-test (p = 0.021). Meanwhile, there was no significant difference in pre-test and post-test VAS score with marital status (p > 0.05). The single group reported higher median for total PCS in pre-test (median = 40.5, IQR = 21) and

post-test (median = 38.5, IQR = 26). For VAS score, single group also recorded higher median in pre-test (median = 8, IQR = 3) and post-test (median = 6, IQR = 3).

There were no significant differences in respondents' pre-test and post-test of PCS and VAS with age group. This could be seen in pre-test and post-test total PCS, rumination, magnification and helplessness (p > 0.05). Meanwhile, there was no significant difference in pre-

test and post-test VAS (p > 0.05). Age group of 41-55 reported the highest median pre-test (median = 31.5, IQR = 24) and post-test (median = 24.5, IQR 26) (Table 6).

Respondents' pre-test and post-test of PCS and VAS with occupation are illustrated in Table 7. There were no significant differences in pre-test and post-test total PCS, rumination, and helplessness (p > 0.05). However, there was significant difference in pretest magnification with (p = 0.008). Meanwhile, there was no significant difference in pre-test and post-test VAS (p > 0.05). Unemployed group was reported to have the highest median in pre-test (median = 32.5, IQR = 28) and post-test (median = 27, IQR = 29).

Discussion

Results from this study revealed that there was a significant reduction in the mean total PCS score from after dry needling therapy for patients with neck pain. Each component of PCS (rumination, magnification or helplessness) showed significant reduction after dry needling therapy (p < 0.05). Numerous intervention studies have shown that treatment aimed at facilitating recovery or adaptation to chronic pain is associated with decreases of catastrophic thinking (17,18). The patient education package that was administered to the respondents was deemed effective in patients' acceptance of dry needing treatment for neck pain. Consequently, the study conducted in this tertiary hospital has shown that dry needling therapy reduced catastrophizing thinking in patients with neck pain. Hence, dry needling therapy is an effective treatment to facilitate recovery for patients with neck pain. Moreover, VAS score showed significant reduction from (6.47 ± 1.414) to (4.78 ± 1.237) after dry needling therapy. Previous study reported similar findings of VAS score reduction in neck pain immediately after dry needling therapy and also on the day after (1). A similar, study by Casanueva et al. reported that patients severely affected by fibromyalgia also showed short-term improvements in pain reduction following weekly dry needling for six weeks (19).

There was significant difference in baseline PCS in magnification subscale between ethnic groups where Chinese showed a higher median score. We postulate that, Ethnic Malays tend to rely on religious solace to cope with pain as compared to other ethnic races. However, the score did not show any significant differences after dry needling therapy. A study on catasatrophizing among different ethnic groups revealed that situational catastrophizing did significantly vary by ethnicity, though the study compared different ethnic groups from African Americans, Asians and Caucasians

(20). Conversely, Hsieh et al. reported that Chinese have greater pain catastrophizing as compared to Euro-Canadian (21).

This study reported no significant differences in PCS score among different age group. 16 (50%) of the respondents were from the age group of 41-55 years, which suggested that they may be more prone to stress and strain, thus resulting in neck pain. Riley et al. highlighted in their study that middle-aged individuals had the highest pain catastrophizing, and it was likely due to life circumstances, attitudes and beliefs about pain and aging (22). Ruscheweyh et al. found that catastrophizing in young adults was associated with emotional response to pain while in older subjects, it was associated with the actual pain intensity (23).

Single respondents reported significantly higher post-test PCS in rumination than respondents who were married. Sullivan et al. in their 'communal coping hypothesis', indicated that catastrophizers may exaggerate the pain expression to obtain maximal proximity, assistance or empathy from society (24). Single individuals who have less social support tend to catastrophize in order to acquire assistance from others. On the contrary, married individuals who have stable social support from their spouse and family tend not to catastrophize . However, in our study, only rumination element of PCS showed significant difference between different marital status but not magnification and rumination.

The pre- and post-test PCS reported that unemployed respondents scored the highest, followed by private sector worker, and thirdly government servants. There was significant difference in pretest PCS in magnification between different occupation groups where those who work in the private sector showed the highest pretest magnification. Azevedo et al. reported that high perception of pain was observed among the unemployed, elderly, and less educated (25).

In conclusion, dry needling should be promoted as one of the modalities available in the armamentarium of treatment for neck pain. A large prospective study comparing conventional therapy with dry needling therapy would be the way forward to confirm the effectiveness of this treatment.

Conclusion

It can be concluded from this study that dry needling is effective in reducing pain catastrophizing and intensity. Healthcare providers should play a role in educating patients in relation to the importance of dry needling treatment techniques and outcomes to reduce neck pain.

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