EFFECTIVENESS OF INHIBITIVE DISTRACTION TECHNIQUE ON HEADACHES DUE TO CERVICAL DYSFUNCTION

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ABSTRACT: Headache (cephalalgia) is an extremely common unpleasant symptom. The main factors contributing for cervicogenic and tension type headache is due to myofascial trigger points, muscle tightness and decreased mobility at suboccipital muscles and upper cervical segments and also proposed significant correlation between forward head posture and headache. Neuroanatomical explaination of both headaches is due to increase sensitization of trigeminocervical nucleus through trigeminocervico nucleus caudalis. These sensitizations of trigeminal nucleus caudalis happen due to increase peripheral nociceptive input from myofascial trigger points in suboccipital muscles. Treatment approaches to overcome headache, includes pharmacological, non-pharmacological, anesthetic and surgical intervention. In that spinal manipulation found to be more effective.

METHODOLOGY: Prior to intervention the parameters like VAS, NDI, HDI and CROM were measured for both the groups and underwent IDT for 4 weeks at a rate of 3 sessions per week. Outcome measures were taken at 2nd and 4th week.

SUBJECTS: 30 subjects both male and female of age groups 25–45 years who has been diagnosed as CH & TTH on the basis of IHS referred by physician KRH Mysore.

PROCEDURE: 30 subjects who fulfilling inclusion criteria were included in the study they were randomized into 2 groups. Group A (TTH) n=15 & Group B (CH) n=15. The duration of treatment was 4 weeks 12 sessions. Outcome measures included the CROM, VAS, NDI and HDI scores.

RESULT: Result showed highly significant improvement in all the parameters within the groups at 2nd and 4th wk following intervention (IDT). Result also showed non-significant improvement in all the parameters between the groups.

CONCLUSION: Study found significant improvement in all the parameters in both the groups. IDT can be used in therapeutic intervention to relieve symptoms of CH & TTH.

KEYWORDS: Inhibitive Distraction, VAS, NDI and ROM.

HOW TO CITE THIS ARTICLE: Kumudini R. M, Leelatejaswini. "Effectiveness of Inhibitive Distraction Technique on Headaches Due to Cervical Dysfunction". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 48, November 16, 2015; Page: 8441-8449, DOI: 10.18410/jebmh/2015/1153

INTRODUCTION: Neck pain due to repetitive work, exposure level, and psychological factors like stress, high job demand, physical risk factors and poor postural mechanics during sitting and activities of daily living (ADL's).[1]

Sustained activation of type I motor unit leads to ca^{2+} accumulation inside the active motor units and causes disturbances in homeostasis. This leads to decrease in local blood supply and increases metabolic waste products in muscle compartment, which increases nociceptor sensitization due to increase in intramuscular shear forces resulting in decreasing the mobility of joint segment.[2]

Headache (cephalalgia) is an extremely common unpleasant symptom. Headache may arise when nociceptive input is received from the head or structure that can refer pain to head.[3] Headache is classified as cervicogenic headache, tension type headache and migraine type of headache on the basis of diagnostic criteria proposed by headache classification committee of International Headache Society (IHS).

The cervicogenic headache as "referred pain perceived in any region of the head caused by a primary nociceptive source in the musculoskeletal tissues innervated by cranial nerves".[4]

PATHOPHYSIOLOGY OF CERVICOGENIC HEADACHE: Interneurons within the trigeminocervical nucleus allow for an exchange of sensory information between the upper cervical spinal nerves and the trigeminal nerve. It is through this exchange of sensory information that nociceptive signals from the anatomic structures and soft tissues of the upper region of the neck can be referred to the sensory receptive fields of the trigeminal nerve in the head and face. The topographic arrangement of the trigeminal nucleus caudalis allows the greatest interchange of nociceptive information with the ophthalmic division of the trigeminal referred to the forehead, temple or orbit.

Afferent sensory signals ascend or descend up to three spinal cord segments in the dorsolateral tract and substantia gelatinosa before entering the spinal dorsal horn. This can allow nociceptive signals from spinal segments as low as C6 or C7 the potential to interact with

Financial or Other, Competing Interest: None.
Submission 08-09-2015, Peer Review 09-09-2015,
Acceptance 11-09-2015, Published 16-11-2015.
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DOI: 10.18410/jebmh/2015/1153

interneurons in the trigeminocervical nucleus, and thereby, the referral of pain from anatomical structures or soft tissues in the middle and lower portion of the neck to the head and face.[5]

Tension type headache: The IHS recognizes two forms of tension headache–Episodic and chronic headache. In episodic form there are fewer than 15 headache days per month. In chronic form 15 or more headache days per month. Both forms are bilateral and characterized by sensations of pressing and tightening around the head.[6]

PATHOPHYSIOLOGY OF TENSION TYPE HEADACHE:

Several mechanisms have been implicated in the pathophysiology of chronic tension headache, including peripheral mechanism, central mechanism, differences in biochemistry, muscular factors and mechanical factors because tension in the muscles of face, head, scalp is prominently involved in chronic tension headache, muscular factors are usually first to be explored when investigating the pathophysiology of this headache type. Possible biochemical basis for the pathophysiology of chronic tension type headache have found the levels of calcitonin gene related peptide (CGRP).[7]

Mechanical factors and sensitization of central nervous system also appear to play a role that is patients with chronic tension headache are more sensitive to pressure, pain, thermal and electrical stimulation. Increased headache intensity is thought to be a result of a peripheral mechanism in episodic tension headache and to a central mechanism in chronic form.

So the perception of any headache depends on the degree of excitation of trigemino cervical nucleus. It has been proposed that nociceptive activity in the trigeminocervical nucleus is normally inhibited by descending neural pathway arising from ventrolateral periaqueductal grey matter in the brainstem via the rostroventro medial medulla. These pathways primarily use serotonin as neurotransmitter. (Fields 1997).[8]

Minimal cervical dysfunction or painful afferent input from the muscle or fascia is sufficient to trigger more nociceptive input to trigeminonucleus causing cervicogenic headache.

In tension type headache central sensitization that is trigeminonucleus sensitization occurs due to increased peripheral nociceptive input from myofascial trigger points in suboccipital muscles and sternocleidomastoid muscles.

Thus cervicogenic headache and tension type headache have the etiology within the central nervous system which alters the cervical muscle activity leading to cervical dysfunction.[9] So the main factors contributing for cervicogenic and tension type headache is due to myofascial trigger points, muscle tightness and decreased mobility at suboccipital muscles and upper cervical segments respectively.

Simons et al (1999)[10] stated that postural abnormalities i.e. forward head posture in the cervical spine might be responsible for the activation of myofascial trigger points in the neck muscles and also result in shortening of the posterior cervical extensor muscles (suboccipital, semispinalis, splenni and upper trapezius).

Postural disorders often contribute to the perpetuation of TrPs. For example, postural strain of the suboccipital muscles may cause TrPs in these muscles,[10] leading to further deterioration in muscle structure and function. Such deterioration may result in radiating pain and atrophic changes.[11] Suboccipital muscles contain a high density of proprioceptors,[12] so atrophic changes lead to a loss in proprioceptive balance and loss of proprioceptive "gate control" at the dorsal horn, giving rise to chronic pain syndromes.[11] Hack et al (1995)[13] discovered fibrous connective tissue between the rectus capitis posterior minor muscle and dura matter it was hypothesed that traction of spinal dura matter may increase tension of fibrous connective tissue leading to tension type headache.

Several non invasive physical treatments like TENS, cold packs, hot packs, massage and spinal manipulation are given for these types of headaches. Of all these spinal manipulation are found to be most effective and have shown shorter effect similar to the effect of drug Amitriptyline.[14]

A technique called Inhibitive Distraction Technique (IDT) which originated from cranial osteopathy. In this technique therapist uses the fingers of both the hands to exert a sustained ventro cranial force on occiput just caudal to superior nuchal line. The physiological effect of Inhibitive distraction technique involve inhibition of local and general posterior muscle tone, inactivation of suboccipital muscle trigger points, spasm of connective tissue between rectus capitis posterior minor muscle and the dura matter and gentle joint mobilization. These physiological effects probably may reduce peripheral sensitization and indirectly reduce central sensitization helps in reducing both cervicogenic and tension type headache. This mobilization is also found to be effective in activation of descending inhibitory pathway.

OBJECTIVES:

1. To find the long term effect of Inhibitive Distraction Technique on cervicogenic headache.
2. To find the long term effect of Inhibitive Distraction Technique on tension type headache.
3. To find the long term effect of Inhibitive Distraction Technique on tension type headache verses cervicogenic headache.

MATERIALS USED:

- Patients both male and female of age group 25-45 yrs who has been diagnosed as CH & TTH on the basis of HIS.
- Patients suffering from cervical dysfunction includes:
- Patients having headache associated with neck pain affecting ADL activities and having decrease CROM.
- Cases have been included tension type headache and cervicogenic headache done according to the guidance given by International headache society (IHS).
- Patients having forward head posture with headache.

- Universal goniometer.
- Couch.
- Visual Analogue Scale (VAS).
- Neck Disability Index (NDI).
- Beta Headache Disability Index (HDI).
- Range of Motion of Cervical spine (CROM).

RESULTS: Result showed highly significant improvement in all the parameters within the groups at 2nd and 4th week following intervention (IDT). Result also showed non-significant improvement in all the parameters between the groups.

Result of the study shown significant improvement in VAS in both the groups. However the study shown significant difference within the group ($p<0.00$) and non-significant difference between the groups ($p<0.301$).

Result of the study shown significant improvement in NDI in both the groups. However the study shown significant difference within the group ($p<0.00$) and non-significant difference between the groups ($p<0.239$).

Result of the study shown significant improvement in HDIE in both the groups. However the study shown significant difference within the group ($p<0.00$) and non-significant difference between the groups ($p<0.645$).

Result of the study shown significant improvement in HDIF in both the groups. However the study shown significant difference within the group ($p<0.00$) and non-significant difference between the groups ($p<0.265$).

Result of the study shown significant improvement in Flexion CROM in both the groups. However the study shown significant difference within the group ($p<0.00$) and non significant difference between the groups ($p<0.640$).

Result of the study shown significant improvement in Extension CROM in both the groups. However the study shown significant difference within the group ($p<0.00$) and non significant difference between the groups ($p<0.677$).

Result of study shown significant improvement in Lateral flexion (Rt) CROM in both the groups. However the study shown significant difference within the group ($p<0.00$) and non-significant difference between the groups ($p<0.574$).

Result of the study shown significant improvement in Lateral flexion (Lt) CROM in both the groups. However the study shown significant difference within the group ($p<0.00$) and non significant difference between the groups ($p<0.395$).

Result of the study shown significant improvement in Rotation (Rt) CROM in both the groups. However the study shown significant difference within the group ($p<0.00$) and non significant difference between the groups ($p<0.433$).

Result of the study shown significant improvement in Rotation (Lt) CROM in both the groups. However the study shown significant difference within the group ($p<0.00$) and non-significant difference between the groups ($p<0.463$).

DISCUSSION: The purpose of the study was to find the efficacy of Inhibitive distraction technique on cervicogenic headache against tension type headache.

The result of the study shown significant improvement in reducing the pain, improving ROM and to overcome of their disability due to tension type headache and cervicogenic headache following IDT.

In the study the criteria for diagnosing CH & TTH was classified on the basis of International headache society (IHS). Neuroanatomical explaination of both headaches is due to increase sensitization of trigeminocervical nucleus through trigeminocervico nucleus caudalis. These sensitizations of trigeminal nucleus caudalis happen due to increase peripheral nociceptive input from myofascial trigger points in suboccipital muscles.[15] Several studies Fernandez-de-las-Penas C et al (2006) proposed myofascial trigger points of suboccipital muscles are main contributor factor for TTH & CH. Suboccipital muscle myofascial trigger points happen due to forward head posture.[16,17,18] Some ENT cause of headache are frontal sinusitis, complicated case of chronic suppurative otitis media, migranous headache. Physiotherapy treatment for ENT cause of headache is SWD.

Postural deviations ie forward head posture results in suboccipital compression, trigeminocervical complex stimulation compression of facet joints, alteration of cervical spine biomechanics and proprioceptive input. It has been proposed that forward head posture results in cranio-cervical extension, suboccipital muscles hypertonicity and decreased cranio-cervical flexion mobility.[15]

Non pharmacological treatment included spinal manipulation, TENS, biofeedback, relaxation therapy, acupuncture, psychotherapy.

Inhibitive Distraction Technique which has its origin of cranial osteopathy to inhibit the trigger point muscle and to gain improvement in ROM. In his pilot study found significant improvement with respect to pain and ROM following intervention. He proposed the effect could be due to inhibition of local and general muscle tone of sub occipital muscle by giving ischemic pressure on these muscles through finger tips and improving the pain and ROM through neurophysiologic and mechanical effect of distraction and ventro cranial glide. The same physiological effect might have happen in our study assisted in increasing the ROM and reducing the pain in both TTH and CH. There was also significant improvement in emotional and functional ability in both the groups following intervention.

It has been proposed that nociceptive activity in the trigeminocervical nucleus is normally inhibited by descending neural pathway arising from ventroperiaqeductal grey matter in the brainstem via rostoventral medial medulla these pathways primarily use serotonin as a neurotransmitter for inhibition (Fields 1997).[8]

Various studies shown there is a modification of adrenocorticotropic hormone and decrease in plasma serotonin in the patients suffering from headache. This change in neurohormonal axis impact on neuromodulation of sleep, pain and mood.[19,20,21] These above studies

correlate with the result of the studies where there was higher score in emotional and functional aspects in HDI which was reduced following the intervention. This could be due to inhibiting myofascial trigger and improving cervico-occipital joint mobility helped in reducing more nociceptive input from trigeminocervical nucleus might have assisted in increase in serotonin formation and helped in overcoming disturbance of emotional and functional aspect.

However in the present study TTH and CH group showed non significant differences between them in their symptoms followed 4th wks of IDT intervention, shows long term IDT is effective in relieving symptoms of both TTH and CH.

CONCLUSION: The study concludes Inhibitive Distraction Technique is highly effective in relieving symptoms of Cevicogenic headache & Tension type headache.

So the study concludes that IDT can be used in therapeutic intervention to relieve symptoms of Cervicogenic headache & tension type headache.

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INTER AND INTRA GROUP ANALYSIS OF VAS:

	Group	Mean	Std. Deviation	N
VASPRE	TTH	6.27	1.100	15
	CH	5.93	.961	15
	Total	6.10	1.029	30
VAS2WK	TTH	3.80	1.207	15
	CH	3.53	.743	15
	Total	3.67	.994	30
VAS4WK	TTH	1.93	.799	15
	CH	1.60	.632	15
	Total	1.77	.728	30

Table 1: Descriptive Statistics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
CHANGE	283.089	2	141.544	451.509	.000
CHANGE* GROUP	.022	2	.011	.035	.965
Error(CHANGE)	17.556	56	.313		

Table 2: Tests of Within-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	1330.178	1	1330.178	677.455	.000
GROUP	2.178	1	2.178	1.109	.301
Error	54.978	28	1.963		

Table 3: Tests of Between-Subjects Effects

Inter and Intra group analysis of NDI:

	Group	Mean	Std. Deviation	N
NDIPRE	TTH	29.47	4.172	15
	CH	29.07	5.230	15
	Total	29.27	4.653	30
NDI2WK	TTH	18.93	5.284	15
	CH	16.67	3.754	15
	Total	17.80	4.649	30
NDI4WK	TTH	10.73	5.405	15
	CH	8.80	3.075	15
	Total	9.77	4.431	30

Table 4: Descriptive Statistics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Change	5762.689	2	2881.344	220.297	.000
Change* Group	14.867	2	7.433	.568	.570
Error(change)	732.444	56	13.079		

Table 5: Tests of Within-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	32300.278	1	32300.278	883.364	.000
Group	52.900	1	52.900	1.447	.239
Error	1023.822	28	36.565		

Table 6: Tests of Between-Subjects Effects

Inter and Intra group analysis of HDIE:
Descriptive Statistics:

	Group	Mean	Std. Deviation	N
HDIEPRE	TTH	17.33	9.552	15
	CH	18.20	8.368	15
	Total	17.77	8.834	30
HDIE2WK	TTH	9.80	5.074	15
	CH	10.13	4.103	15
	Total	9.97	4.537	30
HDIE4WK	TTH	3.00	2.236	15
	CH	4.33	2.440	15
	Total	3.67	2.397	30

Table 7: Tests of Between-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
CHANGE	2993.400	2	1496.700	89.913	.000
CHANGE* GROUP	3.756	2	1.878	.113	.894
Error(CHANGE)	932.178	56	16.646		

Table 8: Tests of Within-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	9859.600	1	9859.600	133.044	.000
GROUP	16.044	1	16.044	.217	.645
Error	2075.022	28	74.108		

Table 9: Tests of Between-Subjects Effects

Inter and Intra group analysis of HDIF:

	Group	Mean	Std. Deviation	N
HDIFPRE	TTH	23.33	7.509	15
	CH	26.13	8.052	15
	Total	24.73	7.781	30
HDIF2WK	TTH	13.87	5.579	15
	CH	16.33	8.682	15
	Total	15.10	7.279	30
HDIF4WK	TTH	5.67	3.658	15
	CH	8.73	10.299	15
	Total	7.20	7.752	30

Table 10: Descriptive Statistics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
CHANGE	4626.289	2	2313.144	118.152	.000
CHANGE* GROUP	1.356	2	.678	.035	.966
Error(CHANGE)	1096.356	56	19.578		

Table 11: Tests of Within-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	22121.344	1	22121.344	164.556	.000
GROUP	173.611	1	173.611	1.291	.265
Error	3764.044	28	134.430		

Table 12: Tests of Between-Subjects Effects

Inter and Intra group analysis of Flexion CROM:

	Group	Mean	Std. Deviation	N
FlexPRE	TTH	38.87	7.120	15
	CH	38.93	6.330	15
	Total	38.90	6.619	30
Flex2WK	TTH	45.33	7.078	15
	CH	43.33	6.102	15
	Total	44.33	6.572	30
Flex4WK	TTH	49.33	5.420	15
	CH	48.00	6.761	15
	Total	48.67	6.059	30

Table 13: Descriptive Statistics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
CHANGE	1436.867	2	718.433	198.732	.000
CHANGE* GROUP	16.689	2	8.344	2.308	.109
Error(CHANGE)	202.444	56	3.615		

Table 14: Table Tests of Within-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	173976.100	1	173976.100	1457.513	.000
GROUP	26.678	1	26.678	.223	.640
Error	3342.222	28	119.365		

Table 15: Tests of Between-Subjects Effects

	GROUP	Mean	Std. Deviation	N
ExtPRE	TTH	39.00	9.297	15
	CH	39.13	6.255	15
	Total	39.07	7.786	30
Ext2WK	TTH	45.13	7.039	15
	CH	43.87	6.209	15
	Total	44.50	6.553	30
Ext4WK	TTH	50.00	6.814	15
	CH	48.00	5.916	15
	Total	49.00	6.352	30

Table 16: Descriptive Statistics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
CHANGE	1484.422	2	742.211	171.311	.000
CHANGE* GROUP	17.622	2	8.811	2.034	.140
Error(CHANGE)	242.622	56	4.333		

Table 17: Tests of Within-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	175739.211	1	175739.211	1265.424	.000
GROUP	24.544	1	24.544	.177	.677
Error	3888.578	28	138.878		

Table 18: Tests of Between-Subjects Effects

Inter and Intra group analysis of Lateral Flexion (Rt) CROM:

	Group	Mean	Std. Deviation	N
LFOPRE	TTH	38.73	8.548	15
	CH	40.33	4.639	15
	Total	39.53	6.806	30
LFO2WK	TTH	44.00	7.010	15
	CH	44.80	4.617	15
	Total	44.40	5.846	30
LFO4WK	TTH	48.00	6.928	15
	CH	49.33	4.577	15
	Total	48.67	5.809	30

Table 19: Descriptive Statistics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
CHANGE	1253.067	2	626.533	135.061	.000
CHANGE* GROUP	2.489	2	1.244	.268	.766
Error(CHANGE)	259.778	56	4.639		

Table 20: Tests of Within-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	175827.600	1	175827.600	1632.231	.000
Group	34.844	1	34.844	.323	.574
Error	3016.222	28	107.722		

Table 21: Tests of Between-Subjects Effects

Inter and Intra group analysis of Lateral Flexion (Lt) CROM:

	Group	Mean	Std. Deviation	N
LFOLPRE	TTH	39.33	7.287	15
	CH	41.00	3.873	15
	Total	40.17	5.796	30
LFOL2WK	TTH	43.93	7.235	15
	CH	46.20	4.329	15
	Total	45.07	5.971	30
LFOL4WK	TTH	48.87	7.415	15
	CH	50.33	3.519	15
	Total	49.60	5.751	30

Table 22: Descriptive Statistics

Tests of Within-Subjects Effects:

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Change	1335.489	2	667.744	242.956	.000
Change* Group	2.600	2	1.300	.473	.626
Error(Change)	153.911	56	2.748		

Table 23: Descriptive Statistics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	181800.278	1	181800.278	1859.291	.000
GROUP	72.900	1	72.900	.746	.395
Error	2737.822	28	97.779		

Table 24: Tests of Between-Subjects Effects

Inter and Intra group analysis of Rotation (Rt) CROM:

	GROUP	Mean	Std. Deviation	N
ROTPRE	TTH	49.67	3.994	15
	CH	48.33	4.082	15
	Total	49.00	4.026	30
ROT2WK	TTH	55.13	4.224	15
	CH	53.67	4.419	15
	Total	54.40	4.312	30
ROT4WK	TTH	59.33	3.200	15
	CH	58.67	4.419	15
	Total	59.00	3.806	30

Table 25: Descriptive Statistics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
CHANGE	1503.200	2	751.600	624.681	.000
CHANGE* GROUP	2.756	2	1.378	1.145	.326
Error(CHANGE)	67.378	56	1.203		

Table 26: Tests of Within-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	263737.600	1	263737.600	5556.455	.000
GROUP	30.044	1	30.044	.633	.433
Error	1329.022	28	47.465		

Table 27: Tests of Between-Subjects Effects

Inter and Intra group analysis of Rotation (Lt) CROM:

	GROUP	Mean	Std. Deviation	N
ROTLPRE	TTH	47.67	8.633	15
	CH	47.33	4.952	15
	Total	47.50	6.917	30
ROTL2WK	TTH	55.33	7.669	15
	CH	52.33	5.300	15
	Total	53.83	6.654	30
ROTL4WK	TTH	59.67	6.935	15
	CH	58.00	5.606	15
	Total	58.83	6.254	30

Table 28: Descriptive Statistics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
CHANGE	1935.556	2	967.778	97.747	.000
CHANGE* GROUP	26.667	2	13.333	1.347	.268
Error(CHANGE)	554.444	56	9.901		

Table 29: Tests of Within-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	256533.611	1	256533.611	2271.485	.000
GROUP	62.500	1	62.500	.553	.463
Error	3162.222	28	112.937		

Table 30: Tests of Between-Subjects Effects