

## **The perception of intramuscular injection pain in men vs women.**

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### **Abstract**

Considerable evidence suggests that men and women experience pain differently, and gender – related influences on pain responses have recently received a great deal of scientific and clinical attention. Epidemiologic and survey research typically have demonstrated greater frequencies of pain related symptoms among women than men in the general population. Therefore, the present study was undertaken to estimate pain sensitivity using visual analogue pain scale (VAS) following intramuscular injections among adult men and women. This comparative study had total 300 subjects – 140 men and 160 women. Subjects included both men and women in the age group 15 to 45 years. The study was conducted at Victoria Hospital, Bangalore Medical College and Research Centre, Bangalore, Karnataka, India. All subjects received multivitamin intramuscular injections (3 ml) in the gluteal region using 23G needle and subjective pain was assessed using VAS scale. All the data was statistically analysed. Moderately significant higher pain scores was associated with women ( $1.94 \pm 1.10$ ) as compared to men ( $1.74 \pm 1.24$ ) ( $p = 0.060$ ). Recent studies have shown moderate difference in pain perception between men and women, with women reporting an increased sensitivity to pain and these gender differences appear greatest in middle age. Our study conducted in a sample of south Indian population has revealed similar results.

**Keywords:** Visual analogue pain scale, intramuscular injections, men and women

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### **Introduction**

#### ***Are there gender differences in pain?***

Gender differences in pain responses have received increasing attention in recent years. Pain perception is characterized by tremendous individual differences and is influenced by multiple biopsychosocial variables. Epidemiologic data have consistently demonstrated gender differences with women reporting a higher frequency of several types of pain. It has been found that women are more sensitive to experimental painful stimulation than men [1, 2,3].

Yet, this is neither universally nor largely accepted. There are statistical differences found in approximately 1/3 of the published studies and the differences are often in the small to moderate range [4,5].

Nonetheless, enough of a difference is observed with enough regularity to suggest that men and women probably perceive painful stimuli differently. The nociceptive

information processing is different between men and women. This provides a basis for gender differences in the perception and behavioral response to pain [6, 7]. To study the perception of pain, intramuscular injections are one of the most common and frequently used medical procedures, world wide [8].

Therefore the present study was undertaken to evaluate the effect of gender on pain perception using visual analogue pain scale (VAS) after intramuscular injections among a sample of south Indian adult men and women.

### **Methods**

This comparative study had total 300 subjects – 140 men and 160 women. Subjects, both men and women from the general population in the age from 15 to 45 years were included. All the women subjects included had normal menstrual cycles and were in the early part (1<sup>st</sup> week) of the menstrual cycle. The study was conducted at Victoria Hospital, Bangalore Medical College and Research Cen-

tre, Bangalore, Karnataka, India. Subjects were examined for general physical health, clinical and menstrual history details were taken through a standard proforma and questionnaire. Informed, written, witnessed consent was taken from all the subjects prior to the investigation. Subjects with obvious disease (i.e., Diabetes Mellitus, hypertension, neurological or psychiatric disorders, coagulopathies and systemic infections) were excluded from the study. Also were excluded those on antidiabetic / antihypertensive / glucocorticoids / other drugs - central or peripheral acting analgesics or sedatives which might have an effect on the study. The study was approved by the Institutional Ethical Committee.

### Procedures

All subjects received multivitamin intramuscular injections (3 ml) in the gluteal region using 23G needle. Intramuscular injections were administered by trained and experienced professional nurses. Subjective pain was assessed using VAS on 0 (no pain) – 10 (maximum pain) scale.

### Statistical Analysis: [9,10]

All data were analysed by SPSS 15.0, stata 8.0, Med Calc 9.01 and Systat 11.0. Results on continuous measurements were presented as Mean  $\pm$  SD (Min-Max) and results on categorical measurements are presented in Num-

ber (%). Significance is assessed at 5% level of significance. Mann Whitney U test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between men and women (inter group analysis).

### Significant figures:

+ Suggestive significance (P value:  $0.05 < P < 0.10$ )

\* Moderately significant (P value:  $0.01 < P \leq 0.05$ )

\*\* Strongly significant (P value  $P \leq 0.01$ )

MS offices' excel and word was used to generate the tables.

### Results

This comparative study comprised total 300 subjects – 140 men and 160 women. Subjects included both men and women in the age group 15 to 45 years. Subjective pain was assessed using VAS on 0 (no pain) – 10 (maximum pain) scale in the subjects and were compared.

Using Mann Whitney U test (two tailed, independent), a moderately significant higher pain scores were observed in women ( $1.94 \pm 1.10$ ) as compared to men ( $1.74 \pm 1.24$ ) ( $p = 0.060$ ) (Table 1).

Also statistically significant higher pain scores were observed in women ( $2.24 \pm 1.19$ ) as compared to men ( $1.71 \pm 1.06$ ) in the age group of 21-30 ( $p = 0.036$ ) (Table 1)

**Table 1.** Visual Analogue Pain Scale (VAS) scores of men and women.

Age in years	Men	Women	Significance
15 -20	$1.84 \pm 1.71$ (0-7)	$1.83 \pm 0.96$ (0-3)	0.520
21-30	$1.71 \pm 1.06$ (0-5)	$2.24 \pm 1.19$ (0-5)	0.036*
31-40	$1.64 \pm 0.99$ (0-4)	$1.66 \pm 1.15$ (0-4)	0.952
41-45	$1.64 \pm 1.16$ (0-4)	$1.97 \pm 0.89$ (0-4)	0.120
Total:	$1.74 \pm 1.24$ (0-7)	$1.94 \pm 1.10$ (0-5)	0.060*

### Discussion

In the present study, a moderately significant higher pain scores were observed in women than the men. Also significant higher pain scores were observed in women as compared to men in the age group of 21-30 years. This suggests that there is an increased sensitivity to pain in women and these differences appear to be greatest in middle age. Such observations are equivocal with earlier

reported findings [4,5,11,12,13]. Various systems could influence pain responses in a gender – dependent manner. They include gonadal hormone activity, endogenous pain modulatory pathways (both inhibitory and excitatory) and psychosocial factors [14].

The gonadal hormones can alter the processing of nociceptive information in both the central nervous system (CNS) and the peripheral nervous system (PNS). In the

CNS, they influence endogenous opioid systems [15] and the activity of other neuromodulators like substance P [16], amino acids and other neurotransmitters [17]. In the PNS, “silent” afferents arising from the uterus appear to be affected by the estrous cycle. Estrogen alters the receptive field properties of these primary afferents [15]. Different levels of circulating estrogen may have different effects on neuronal activity. Estrogen has excitatory and inhibitory effects in the CNS due to different forms of estrogen receptor activation [18,19]. Changes in plasma estrogen levels can change several neurotransmitters, including serotonin, acetylcholine, dopamine and  $\beta$  – endorphine [20].

Gonadal hormones mediate the opioid and non opioid mediated stress induced analgesia in women [21]. The analgesia displayed by women with intact ovaries is neurochemically different from the men and ovariectomized women [22]. Hence in the present study, all the women subjects had normal menstrual cycles and were in the early part (1<sup>st</sup> week) of the menstrual cycle. Such a selection of women was to avoid the influence of hormonal changes during different phases of the menstrual cycle on the study observations.

There is an increased pain perception in women during depression and anxiety due to defective serotonin regulation [23]. Anxiety probably disrupts the cognitive processing and intensity discrimination of nociceptive information [24] suggesting the increase in pain sensitivity in women. Thus anxiety is probably the salient factor in producing gender differences in pain perception [25,26].

Diffuse noxious inhibitory control (DNIC), a function of endogenous pain modulation can assess the efficacy of CNS pain – modulatory systems [27]. Significantly higher pressure pain threshold (hypoalgesia) is observed in men than in women during DNIC [28,29]. This probably indicates the DNIC effects as more gender specific, with the women generally lacking this pain inhibitory mechanism. However, men in the study are likely to tolerate more pain because of psychosocial factors such as gender role expectations and assumptions that endorse men to be strong [30].

## Conclusions

Pain perception is characterized by tremendous individual differences and influenced by multiple biopsychosocial variables, ethnicity and gender. Anxiety disrupting the cognitive processing and intensity discrimination is probably the salient factor producing gender differences in pain perception. A high degree of masculinity is probably associated with higher pain thresholds in men [31]. This

understanding of pain responses will help to individualize treatment for better chronic pain management.

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