Patterns of Sensory Responses in Women with Fibromyalgia: An Electromyography Study

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BACKGROUND

Fibromyalgia (FM) affects 10 million people in United States. The majority are women (National FM Association, 2010).

Individuals with FM have increased sensory sensitivity toward various stimuli encountered in daily life (Wilbarger & Cook, 2011).

To date, few studies have investigated implicit sensory processing in individuals with FM when exposed to non-painful sensory stimuli.

Affective facial electromyography (EMG) is a technique used to measure implicit affective (emotional) responses to stimuli via changes in specific muscle activities (Fridlune & Cacioppo, 1986).

OBJECTIVES

To examine whether women with FM respond differently to non-painful sensory stimuli than their age-matched healthy controls, as measured by EMG recordings and self-rating scale.

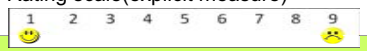
To investigate whether there is a relationship between explicit (self-report) and implicit (EMG) measures of various sensory stimuli.

METHODS

- A quasi-experimental design with between and within groups.
- Participants were 15 women with diagnosis of FM (n=9) and age-matched healthy controls (n=6).

Independent variables, presented in a random order:
- Pure tone: 400 Hz, 1000 Hz, 3000 Hz
- Sound: Baby cry, Mower, and Cricket
- Tactile: Feather, Brush, and Nuk
- Olfactory: Vanilla, Camphor, and Butyric Acid

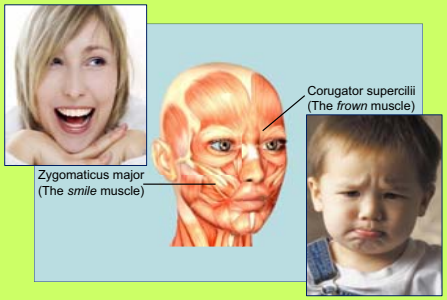
Dependent variables:
- Facial EMG recordings (implicit measures):
  a. corrugator supercilii– the *frown* muscle
  b. zygomaticus major – the *smile* muscle
- Self-report perception of the stimuli – Pleasantness Rating scale(explicit measure)



RESULTS

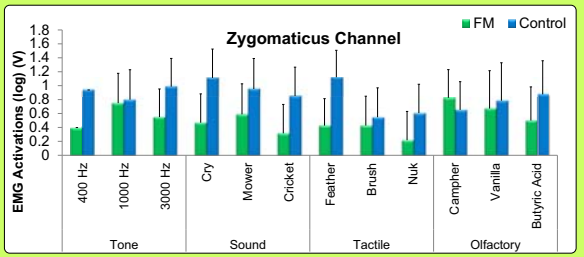
Although non-significant (p > .10), women with FM demonstrate:
- Overall **lower activation of zygomaticus major**, especially toward more positive stimuli.
- Overall **higher activation of corrugator supercilii** in response to all types of stimuli.
- More negative self-ratings across all sensory modalities.

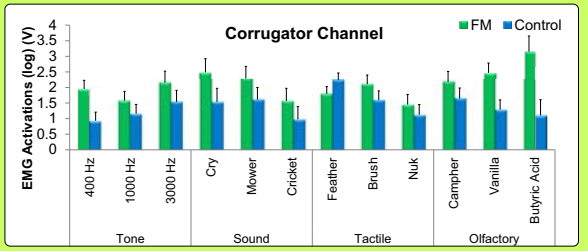
Pearson's r demonstrated **weak to moderate correlations** (r = *.04 to 0.59)* between EMG activities and participants' self-rating of pleasantness in both groups.
- Positive ratings are associated with higher implicit zygomaticus and lower corrugator activations in controls but not in women with FM.
- Strongest relationships found in lawnmower sound and butyric acid odorant for both zygomaticus (r = .43 and r = .59) and corrugator (r = -.49 and r = .42) activities.
- No significant group differences across stimuli (p> 0.10).



Self-rating measures of various stimuli in FM and control groups

Sensory Stimuli		Group	
		FM	Control
Tone	400 Hz	5.00	4.67
	1000 Hz	6.40	5.50
	3000 Hz	7.80	6.83
Sound	Cry	6.60	5.33
	Mower	6.00	5.67
	Cricket	5.90	4.67
Tactile	Feather	3.80	3.50
	Brush	4.70	3.83
	Nuk	5.70	4.83
Olfactory	Camphor	5.00	4.17
	Vanilla	4.70	4.00
	Butyric Acid	6.60	6.17





IMPLICATIONS FOR PRACTICE

It is important for Occupational Therapists (OTs) and other health professionals to have awareness on sensory processing anomalies in individuals with FM.

OTs and other health professionals should include evaluation of sensory profile and consider how sensory issues affect participation in clients' daily lives. Finally, these sensory issues should be addressed during treatments.

CONCLUSIONS

Women with FM process non-painful stimuli more negatively compared to healthy controls, as evidenced by higher activations of the corrugator muscle and lower responses of the zygomaticus muscle to all types of stimuli.

In addition, women with FM perceive non-painful stimuli differently than controls, as demonstrated differences in self-report ratings of pleasantness. Unlike their age-matched controls, there appears to be discrepancies between their implicit (EMG) and explicit (self-rating) responses.

Results of the study support theory of sensory sensitivity in individuals with FM (Geisser et al., 2008; Wilbarger & Cook, 2011).

Direction for future research: Larger sample is required to increase statistical power.

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