

Venipuncture pain perception: predictive value of gender, depression, anxiety, somatosensory amplification, obesity, and age

Yuksel Kıvrak¹, Hatice Kose Ozlece², Mehmet Fatih Ustundag³, Mehmet Asoglu⁴

¹ Kafkas University, Medical Faculty, Department of Psychiatry, Kars, Turkey.

² Kafkas University, Medical Faculty, Department of Neurology, Kars, Turkey.

³ Ataturk University, Medical Faculty, Department of Psychiatry, Erzurum, Turkey.

⁴ Harran University, Medical Faculty, Department of Psychiatry, S.Urfa, Turkey.

e-mail address: haticekse@hotmail.com

Abstract: Factors affecting pain sensation are not fully known. This study examined the effects of gender, age, body mass index, somatosensory amplification, anxiety, and depression on the perception of pain. Venipuncture was performed on 140 healthy individuals. All cases completed a sociodemographic data form, visual analogue scale (VAS), Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), and Somatosensory Amplification Scale (SAS). Height and weight were measured. When the genders were compared, there was no difference in terms of VAS, body mass index (BMI), age, and BDI in women compared with men, but SAS and BAI were found to be higher in women. A correlation was found among VAS points, BAI, and BMI. The results of regression analysis show that the BAI score is a predictor for the VAS score. These results indicate that anxiety may be a predictor of pain, whereas gender, depression, somatosensory amplification, age, and weight do not appear to influence the perception of pain.

[Yuksel KIVRAK, Hatice KOSE OZLECE, Mehmet Fatih USTUNDAG, Mehmet ASOGLU. **Venipuncture pain perception: predictive value of gender, depression, anxiety, somatosensory amplification, obesity, and age.** *Life Sci J* 2016;13(8):26-31]. ISSN: 1097-8135 (Print) / ISSN: 2372-613X (Online). <http://www.lifesciencesite.com>. 5. doi: [10.7537/marslsj130816.05](https://doi.org/10.7537/marslsj130816.05).

Key words: pain perception, anxiety, depression

1. Introduction

The word “pain” comes from the ancient Greek word “poine” (penalty) (Kara,2000). Aristotle described pain as suffering of the soul (Kaplan, 1989). The words “pain,” “hurt,” and “suffering” may be used to express both bodily and mental discomfort (Fogel, 1996). According to the International Association for the Study of Pain, pain is “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Merskey, 1994). It is a complaint related to the interaction of an individual’s physical, psychological and social situation. It indicates the disruption of biopsychosocial balance (Kara,2000).

Around half of the patients referring for examination have a pain complaint of some sort. There is a process related to physiological tissue destruction in acute pain. This is accompanied by increased sympathetic and neuro-adrenergic activity and a reduction in parasympathetic activity. Generally, an anxiety reaction develops due to acute pain (Kara, 2000). Depression and anxiety top the list of psychiatric disorders that frequently affect both men and women (Kıvrak,2011). Just as pain can cause psychiatric disorders, psychiatric diseases may affect the experience of pain. When analyzing the combination of physical pain and psychiatric

disorders, a cause–effect relationship generally cannot be determined (Tütüncü, 2011). Although there are studies on this topic, the majority state that “more studies on this topic would be beneficial.” Research related to the effect of gender differences on pain perception are continually increasing and an increase in the number of studies on this topic has begun recently. Compared with the 1990s, the number of publications on this topic has increased by 2000% (Fillingim, 2009). A review paper published recently emphasized that a variety of biopsychosocial circumstances may affect the pain perception of women and men and thus necessitate further research on this topic (Racine, 2012).

The majority of experimental studies related to pain caused by tissue damage have used animal models. Studies on humans have mostly included individuals with pain complaints. To our knowledge, there is no study on humans assessing the effects of depression, anxiety, gender, somatosensory amplification, age, and weight on the pain perception due to tissue damage. As a result, in this study, we aimed to determine whether there was a relationship between the perception of pain from, venipuncture (one of the most commonly conducted invasive procedures), and gender, and to answer the question of whether this relationship was affected by depression, anxiety, somatosensory amplification, age, and weight.

2. Materials and Methods

This study was completed with individuals applying to Kafkas University Hospital for routine check-ups. The study was completed in a case-controlled manner and the relevant ethical committee permission and written informed consent were obtained. Also we followed the guidelines in the declaration of Helsinki (2004).

Before beginning the study, a set of tests were prepared. A preliminary study was completed with 10 men and 10 women requesting examination. The visual analogue scale (VAS) was found to be 4 ± 2 . For a difference of 0.5, $\alpha = 0.01$, power = 0.9, the minimum sample size was calculated as 137. Patients using psychotropic medications, those with dementia, cognitive disorders, and acute or chronic diseases in their medical history, and those under the age of 16 were excluded from the study. Considering the possibility of lack of completion, the target was set as 160 individuals. Patients were randomly chosen from those applying to the laboratory for health checkups with a random number table on random days. Interviews were conducted with 160 volunteers who agreed to participate in the study. As 17 people did not fully complete the tests, and three people had phobias (blood, needles), they were excluded from the study. The study was completed with 140 people.

Information about the study was given to those who agreed to participate. Height and weight were measured. Weight was divided by the square of height to determine body mass index (BMI). Study subjects were taken to a room where they could be alone. The tests, including the sociodemographic data form, Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), and somatosensory amplification scale (SAS), were completed before venipuncture while the VAS was completed after venipuncture.

Tools: Inventories and psychometric tests

Sociodemographic Data Collection Form was prepared by the researcher

Visual Analogue Scale: This is a scale used to assess the severity of a patient's pain. The scale is 10 cm long with 0 = no pain written at one end and 10 = most severe pain written at the other. Patients are asked to mark where along the scale they would place the pain they perceived. The distance is measured in centimeters. The value shows the severity of pain perceived by the patient (Price, 1983).

Beck Anxiety Inventory: This was developed by Beck et al. to measure the anxiety experienced by an individual (Beck, 1988). It is a Likert-type scale filled in by the individual. The points vary between 0 and 63. For each item one of the choices of none, slightly, moderately, and severely is marked. The validity and

reliability have been completed by the Tukey test (Ulusoy, 1998).

Beck Depression Inventory: This inventory was developed by Beck et al. to measure a variety of symptoms of depression (Beck, 1961). It is a 21-item checklist that patients fill in themselves. They select the most appropriate of the four choices. The validity and reliability have been completed by the Tukey test (Hisli, 1988).

Somatosensory Amplification Scale: This is a scale filled in by patients to investigate their somatosensory amplification with 10 items with points between one and five. With validity and reliability tested for Turkish healthy and patient groups (Güleç, 2007), the scale was developed by Barsky et al. to research the normal somatic senses of a person (Barsky, 1988).

Statistical Assessment of Data

To evaluate the data, the Statistical Package for Social Sciences (SPSS, version 20) program was used. Each group was tested with the Kolmogorov Smirnov test to investigate the normal distribution of the obtained data. The data with normal distribution was analyzed with the Student's *t*-test while the Mann-Whitney *U* test was used for data without normal distribution. Correlation analysis was completed with the Pearson and Spearman methods. The Chi-square test was used to analyze quantitative data while those with expected value below five were analyzed with the Fischer exact chi-square test. To find the predictive values for pain scores, the linear regression analysis method was used. The data obtained are given as arithmetic mean \pm standard deviation, while quantitative data are given as number %. Level of significance was determined as $P < 0.05$.

3. Results

The study group consisted of 42.1% male ($n = 59$) and 57.9% female ($n = 81$). The average age of the women was 40.2 ± 17.4 years while the average age of the men was 40.9 ± 14.4 ($P = 0.79$). Sixty-one women were married (75.3%), while 20 were not (24.7%). Thirty-six men were married (61%) and 23 were not (39%). There was no difference between the groups in terms of marital status. When economic circumstances were examined, there were 7 (8.6%), 15 (18.5%), 36 (44.4%), and 23 (28.4%) women and 5 (8.5%), 14 (23.7%), 29 (49.2%), and 11 (18.6%) men in the worst, second worst, second best, and best income groups, respectively. The difference between the groups was not significant. The average height (1.72 ± 0.065 m) and weight (75.84 ± 10.7 kg) of men was greater than women (1.62 ± 0.059 m versus 65.11 ± 0.065 kg), but there was no significant difference between them in terms of body mass index (24.68 ± 4.1 versus 25.31 ± 3.04). In terms of SAS, the points

for women were 24.68 ± 6.3 , which was greater than the points for men of 21.67 ± 5 ($F=1.41$, $P=0.004$). In terms of anxiety points, there was a significant gender difference (women 20.48 ± 9.87 , men 14.46 ± 8.80 ,

$F=1.187$, $P=0.002$). The depression points for women (4.96 ± 7.27) were more than for men (4.32 ± 5.44), but the difference was not significant ($F=2.610$, $P=0.57$) (Table 1).

Table 1: Socio-demographic Features of the Groups

	Woman n=81			Man n=59			t	P
	mean \pm SD			mean \pm tSD				
Age	40.2	\pm	17.4	40.93	\pm	14.43	0.768	0.795
Education year	6.45	\pm	4.05	8.14	\pm	3.04	13.649	0.009
Height, m	1.62	\pm	0.0599	1.72	\pm	0.0653	0.216	0.000
Weight, kg	65.11	\pm	10.64	75.84	\pm	10.7	0.047	0.000
BMI	24.68	\pm	4.10	25.31	\pm	3.04	9.066	0.32
VAS	4.28	\pm	2.05	3.76	\pm	1.95	0.768	0.133
SAS	24.65	\pm	6.30	21.68	\pm	5.32	1.41	0.004
BAI	20.48	\pm	9.87	14.46	\pm	8.80	1.187	0.002
BDI	4.96	\pm	7.27	4.32	\pm	5.44	2.610	0.57
Marital Status	n		%	n		%	χ^2	P
Married	61		62.9	36		37.1	3.27	0.070
Unmarried	23		53.5	20		46.5		
Economic Circumstances							1.94	0.5
\$ 0-125	7		58.3	5		41.7		
\$ 125-375	15		51.7	14		48.3		
\$ 375-750	36		55.4	29		44.6		
\$ 750-2500	23		67.6	11		32.4		

BMI= Body Mass Index; VAS= Visual Analogue Scale; SAS= Somatosensory Amplification Scale; BAI= Beck Anxiety Inventory; BDI=Beck Depression Inventory; t = paired t test; SD = standard deviation; P = P value (2-tailed)

There was a correlation between VAS and BMI ($r = -1.79$, $P = 0.034$) and BAI ($r = 0.250$, $P = 0.003$) points (Table 2).

Table 2: VAS correlations

	Age		SAS		BAI		BDI		BMI	
	r	P	r	P	r	P	r	P	r	P
VAS	-0.090	0.290	0.082	0.331	0.250	0.003	0.013	0.875	-1.79	0.034

BMI= Body Mass Index; VAS= Visual Analogue Scale; SAS= Somatosensory Amplification Scale; BAI= Beck Anxiety Inventory; BDI=Beck Depression Inventory; P = P value (2-tailed)

Using the VAS scores as dependent variables and using BAI, BDI, SAS, BMI, and gender as independent variables, the regression model found that BAI was a predictive variable for VAS scores ($R = 0.298$, $R^2 = 0.089$, adjusted $R^2 = 0.055$) (Table 3).

Table 3. Linear regression model when VAS is not dependent

Model	B	Std. error	Beta	t	P
Constant	4.81	1.48		3.25	0.001
SAS	0.01	0.03	0.003	0.28	0.98
BAI	0.047	0.019	0.225	2.505	0.013
BDI	-0.015	0.027	-0.048	-0.542	0.589
Gender	0.245	0.355	0.06	0.691	0.491
BMI	-0.078	0.046	-0.142	-1.693	0.093

4. Discussions

In our study, we aimed to examine the effects of gender, depression, anxiety, somatosensory amplification, age, and weight on the perception of pain. We found no difference in the perception of pain between the genders, but the anxiety and somatosensory amplification scores for women were higher than for men. Anxiety score was a predictor for the pain perception. We found depression, BMI, and somatosensory amplification were not predictors of pain perception.

While there did not appear to be a difference between men and women in terms of pain perception in our study, in the literature, there are many studies reporting a difference, as well as studies reporting no differences exist (Hashmi, 2014). One reason that a difference did not appear in our study may be due to the method used. In a review of 172 articles researching the perception of experimentally induced cold, heat, pressure, and ischemic, muscle, chemical, and visceral pain, the pain threshold for pressure was lower in women than in men, but the pain thresholds for cold and ischemic pain were reported to be comparable (Racine, 2012). When examined in terms of pain tolerance, the tolerance of both genders to ischemic pain was comparable, the women had lower tolerance to heat, cold, and pressure than men (Racine, 2012). Another reason for the contradictory publications may be the time factor. Morin et al. in a study of patients after surgery found that pain increased for men at night and for women during the day (Morin, 2000). When examined in terms of not just superficial but also visceral pain, the difference between the genders is controversial. There are studies showing that there may be differences. For example, Nguyen et al. in a study of esophageal distension found that the pain threshold of women was lower (Nguyen, 1995). In some studies assessing people who underwent a variety of operations, the pain during recovery of women was greater (Aubrun, 2005; Krogstad, 1996). However, Sloot et al. in a study researching the rectal stimulation found that there was no difference in terms of gender or age (Sloots, 2000). If it is considered that gender may be an important factor in terms of pain perception, it is expected that there would be a difference between the genders in terms of disability caused by pain, but studies on this topic have found no differences in pain-induced disabilities between men and women (Keogh, 2006).

The complete correlation analysis found a significant correlation between VAS and BAI. Our result is in accordance with the literature. There are many studies showing negative emotions cause an increase the pain (Fillingim, 2009). It has been known for many years from experimental pain studies that the state of anxiety increases the sensitivity to

experimental pain (Rhudy, 2000). Not only in experimental studies but also anxiety before medical procedures in both children and adults increases the pain after the procedure (Palermo, 1996). As expected, reducing anxiety with medication reduces the perception of pain. During the experience of pain, emotional stimulation is important and emotional changes affect pain tolerance (Chapman, 1973). It has been shown that anxiety increases hyperalgesia (Rhudy, 2000; Chapman, 1973). Surprisingly while women's anxiety levels were higher than men, we found no difference in VAS values according to gender. This may explain the question if the effect of anxiety on pain changes according to gender. While women's anxiety levels were higher, in men anxiety may cause an increase in pain (Jones, 2003; Hirsh, 2006).

In our study, we did not find a correlation between depression points and VAS points. The relationship between depression and pain has not been fully explained. There is research indicating that depression may lead to an increase in comorbid pain. One of the reasons for this is that depression may increase the sensitivity to experimental pain. The relationship between depression and an individual's pain threshold is controversial. In addition to articles reporting that depression increases the pain threshold, there are publications reporting no differences or an education in pain threshold (Dickens, 2003). The reason for the differences in the literature may be that comorbid anxiety has not been sufficiently assessed, or there are differences in pain receptors.

In the study, we did not identify a correlation between VAS and age. While there are many studies researching the relationship between age and pain, this topic has not been fully explained. Pickering et al. in a study found that pressure-sensitive nociception decreased with age in men (Pickering, 2002). Some studies have shown a relationship between age and the pain threshold (Wandner, 2012), while many studies have proposed that there is no relationship (Gibson, 2004; Yezierski, 2012). The reason for these differences may be the differences in methods used to gather data, cultural differences of subjects, and no assessments of concurrent anxiety.

We found a negative correlation between VAS and BMI. The reason for this may be a rise in the pain threshold caused by increased BMI. Studies on both humans and mice have found that obesity is related to an increase in pain threshold (Ramazan, 1993; Khimich, 1997; Maffiuletti, 2011). In our study, in addition to the correlation between BMI and VAS score, we found that BMI was not a predictor of the severity of pain according to linear regression analysis. The strong points of our study are that it is the first study on one of the most frequently performed

invasive interventions, IV blood sampling; that subjects were chosen at random; that the scales and inventories used had validity and reliability studies completed for the Turkish translations; and that subjects had no disorders that may induce or affect pain. As the correlations between pain and age, BMI, somatosensory amplification, anxiety, and depression were examined in addition to gender, we believe this study is important. The study contributes to the research on gender and pain. While women had more amplification of somatic senses and are more anxious, their pain assessment was the same as men. Further research on this topic would be beneficial.

There are some limitations to our study. The first is that the study was completed in a university hospital. The second limitation is that our study only used a single type of needle. However, we do not consider this limitation significant because Yee et al. found no difference in their study comparing pain from 23G and 25G needles (Yee, 2014). Another limitation is that we only evaluated pain during IV intervention. It is not known whether the research findings will be valid for pain perception from other pain receptors. Another limitation preventing the generalization of our results is that we did not include children, the elderly, or hospitalized or sick patients. Research on these topics would be beneficial.

In conclusion, anxiety is a predictor of venipuncture pain. It may be important to determine the anxiety of individuals before venipuncture, one of the most commonly used invasive procedures. Precautions to reduce anxiety in the person may reduce the pain felt by the person. Health personnel should be aware of this, and it may be useful to emphasize the importance of anxiety for pain perception during training of health personnel. The clinician paying attention to this situation may positively contribute to the patient–doctor relationship and increase compliance with treatment.

Conflict of Interest: None. No potential conflict of interest relevant to this article are reported.

Corresponding Author:

Dr. Hatice KOSE OZLECE
Kafkas University, Medical Faculty, Department of Neurology, Kars, Turkey.
E-mail: haticekse@hotmail.com

References:

1. Kara H, Abay E. Kronik ağrıya psikiyatrik yaklaşım. *Anadolu Psikiyatri Dergisi*. 2000;1(2):89–99.
2. Kaplan HI, Sadock BJ, Blackwell B. Chronic pain. *Comprehensive textbook of psychiatry*,

- Vols 1 & 2 [Internet]. Baltimore: Williams & Wilkins Co; 1989: 1264–72.
3. Fogel BS, Schiffer RB. Pain and Psychopathology. *Neuropsychiatry*: Williams & Wilkins. 1996.
4. Merskey H, Bogduk N. Task Force on Taxonomy of the International Association for the Study of Pain. Classification of chronic pain: descriptions of chronic pain syndromes and definition of pain terms. Seattle: IASP, 1994.
5. Kıvrak Y., Ülker K., Gündüz S., Ari M. Gebelikte Elektrokonvulsif Tedavi. *Kafkas J Med Sci*. 2011;1(3):133–8.
6. Tütüncü R, Günay H. Kronik ağrı, psikolojik etmenler ve depresyon Chronic pain, psychological factors and depression. *J Dicle Med* 2011;38(2):257-262.
7. Fillingim RB, King CD, Ribeiro-Dasilva MC, Rahim-Williams B, Riley III JL. Sex, gender, and pain: a review of recent clinical and experimental findings. *Pain* 2009;10(5):447–85.
8. Racine M, Tousignant-Laflamme Y, Kloda LA, Dion D, Dupuis G, Choinière M. A systematic literature review of 10 years of research on sex/gender and pain perception - part 2: do biopsychosocial factors alter pain sensitivity differently in women and men? *Pain* 2012;153(3):619–35.
9. Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. *Pain* 1983;17(1):45–56.
10. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol* 1988;56(6):893.
11. Ulusoy M, Sahin NH, Erkmen H. Turkish version of the Beck Anxiety Inventory: psychometric properties. *J Cogn Psychother* 1998;12:163–72.
12. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry* 1961;4(6):561–71.
13. Hisli N. Beck Depresyon Ölçeği'nin bir Türk örnekleminde geçerlilik ve güvenilirliği *Turk J Psychol* 1988;6:118–22.
14. Güleç H, Sayar K, Güleç MY. Bedensel Duyumları Abartma Ölçeği Türkçe Formunun Geçerlik ve Güvenirliği. *Düşünen Adam Psikiyatri Nöroloji Bilim Derg* 2007;20(1):16–24.
15. Barsky AJ, Goodson JD, Lane RS, Cleary PD. The amplification of somatic symptoms. *Psychosom Med* 1988;50(5):510–9.

16. Hashmi JA, Davis KD. Deconstructing sex differences in pain sensitivity. *Pain* 2014;155(1):10–3.
17. Racine M, Tousignant-Laflamme Y, Kloda LA, Dion D, Dupuis G, Choinière M. A systematic literature review of 10 years of research on sex/gender and experimental pain perception - part 1: are there really differences between women and men? *Pain* 2012;153(3):602–18.
18. Morin C, Lund JP, Villarroel T, Clokie CML, Feine JS. Differences between the sexes in post-surgical pain. *Pain* 2000;85(1):79–85.
19. Nguyen P, Lee SD, Castell DO. Evidence of gender differences in esophageal pain threshold. *Am J Gastroenterol* 1995;90(6):901.
20. Aubrun F, Salvi N, Coriat P, Riou B. Sex-and age-related differences in morphine requirements for postoperative pain relief. *Anesthesiology* 2005;103(1):156.
21. Krogstad BS, Jokstad A, Dahl BL, Vassend O. The reporting of pain, somatic complaints, and anxiety in a group of patients with TMD before and 2 years after treatment: sex differences. *J Orofac Pain* 1996;10(3):263–9.
22. Sloots CEJ, Felt-Bersma RJF, Cuesta MA, Meuwissen SGM et al. Rectal visceral sensitivity in healthy volunteers: influences of gender, age and methods. *Neurogastroenterol Motil* 2000;12(4):361.
23. Keogh E, McCracken LM, Eccleston C. Gender moderates the association between depression and disability in chronic pain patients. *Eur J Pain* 2006;10(5):413–413.
24. Rhudy JL, Meagher MW. Fear and anxiety: divergent effects on human pain thresholds. *Pain* 2000;84(1):65–75.
25. Palermo TM, Drotar D. Prediction of children's postoperative pain: the role of presurgical expectations and anticipatory emotions. *J Pediatr Psychol* 1996;21(5):683–98.
26. Chapman CR, Feather BW. Effects of diazepam on human pain tolerance and pain sensitivity. *Psychosom Med* 1973;35(4):330–40.
27. Jones A, Zachariae R, Arendt-Nielsen L. Dispositional anxiety and the experience of pain: gender-specific effects. *Eur J Pain* 2003;7(5):387–95.
28. Hirsh AT, Waxenberg LB, Atchison JW, Gremillion HA, Robinson ME. Evidence for sex differences in the relationships of pain, mood, and disability. *Pain* 2006;7(8):592–601.
29. Dickens C, McGowan L, Dale S. Impact of depression on experimental pain perception: a systematic review of the literature with meta-analysis. *Psychosom med* 2003;65(3):369–75.
30. Pickering G, Jourdan D, Eschalièr A, Dubray C. Impact of age, gender and cognitive functioning on pain perception. *Gerontology* 2002;48(2):112–8.
31. Wandner LD, Scipio CD, Hirsh AT, Torres CA, Robinson ME. The perception of pain in others: how gender, race, and age influence pain expectations. *J Pain* 2012;13(3):220–7.
32. Gibson SJ, Farrell M. A review of age differences in the neurophysiology of nociception and the perceptual experience of pain. *The Clin J Pain*. 2004;20(4):227–39.
33. Yezierski RP. The effects of age on pain sensitivity: preclinical studies. *Pain Med* 2012;13 Suppl 2:S27–36.
34. Ramzan I, Wong BK, Corcoran GB. Pain sensitivity in dietary-induced obese rats. *Physiol Behav* 1993;54(3):433–5.
35. Khimich S. Level of sensitivity of pain in patients with obesity. *Acta Chir Hung* 1997;36(1-4):166–7.
36. Maffiuletti NA, Morelli A, Martin A, Duclay J, Billot M, Jubeau M et al. Effect of gender and obesity on electrical current thresholds. *Muscle Nerve* 2011;44(2):202–7.
37. Yee K, Shetty AL, Lai K. ABG needle study: a randomised control study comparing 23G versus 25G needle success and pain scores. *Emerg Med J* 2014; (5):343-7.

8/24/2016