

## Pain Awareness and Pain Vigilance as Predictors of Pain Tolerance and Pain Acceptance in Patients with Chronic Pain

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Pain is a subjective experience signifying damage in the functioning of the body. A host of factors contribute to chronic pain. The present study focused on the role of cognitive factors in chronic pain. Thus a study has been designed to assess variance of pain awareness and pain vigilance in pain tolerance and pain acceptance. The sample consisted of 100 patients in the age range of 35-55 years, who got admitted for treatment in various hospitals of Delhi was taken. Participants who were suffering from chronic pain for the past one year and doctors have recommended surgery were selected. Standardized tools were used to measure all the variables under study. Multiple regression analysis was done to analyze the data. Pain awareness and pain vigilance emerged as significant predictors of pain acceptance.

**Keywords:** Pain awareness, Pain vigilance, Pain acceptance, Pain tolerance, Chronic pain

Pain is a universal and subjective phenomenon experienced by people in their lives. It signifies that the functioning of the body has been damaged and something needs to be done to cure it. The International Association for Study of Pain (IASP) described pain as a distressing bodily sensation and emotional experience accompanied by potential or actual tissue-damage stimulation. Further, Price (1999) elaborated the definition of pain by adding evaluative aspect to it. He added the component of "perceived threat" to the definition. Thus, Price defined pain as discomforting bodily sensation and unpleasant emotional experience associated with perceived threat. However, McCaffrey, Frock, & Garguilo (2003) defined pain as a personal experience with or without perceived or actual tissue-damage stimulation.

Pain may be classified as acute and chronic. Chronic pain refers to a persistent, long-term pain whereby healing would have been occurred through surgery. Chronic pain lasts beyond time of recovery or for more than three or six months (Kowal, 2015). On few occasions, the underlying cause of chronic pain is known and in some cases, it is not. Chronic pain may begin accidentally or gradually (sometimes as in low back pain) or recurrent (as in migraine

headache). Other chronic pain may include temporomandibular disorders, neuropathic, fibromyalgia and postsurgical pain. Though, it can occur in any phase of life but more commonly seen in middle ages and more in women than men (Kowal, 2015). It was found to have profound adverse effects on physiological functioning (sleep disturbances, low energy level, motor activities), social (marital and family discord, household and recreational activities), economic (financial insecurity) and psychological functioning (impaired cognitive abilities, anxiety, depression, alcohol and drug abuse) of human beings.

Advancement in chronic pain-related researches has revealed the contribution of biological factors. In addition, psychosocial factors, like, emotions, expectations, belief system (Turner, Jensen, & Romano, 2000), interpersonal relationships, attitude, meaning and catastrophizing the pain, social and cultural background and environment tend to influence (Turk & Okifuji, 2002). The biopsychosocial model also explains the etiology of chronic pain, including physiological, psychological and social factors.

A growing body of research emphasizes the central role of beliefs of the people suffering from

chronic pain and its impact on psychological functioning (Stroud, Thorn, Jensen, & Boothby, 2000), coping strategies and behavioral manifestations. Such factors include perception of pain-related symptoms, sense of control on pain, impact of pain on patient's life and worries associated with future (Turner, Jensen, & Romano, 2000). It has been observed that coping with pain arising from the acute injured area and protecting that injured area is an adaptive process. But studies have revealed that in chronic cases it may become maladaptive (Turk & Okifuji, 2002). This is because their belief system is such that it hampers them to resort to rehabilitation. When people are injured they hesitate to indulge themselves in any kind of kinesthetic activity because they think that it may aggravate the injury and consequently pain. Thus, such people develop fear for coping strategies and rehabilitation and hesitate to participate in such activities. As a result, rumination of somatic symptoms and become more hypervigilant and selective, leading to functional limitations and thus maintenance of disability. Moreover, catastrophization of bodily symptoms become more intense and worse with any physical trauma. People, who perceive their bodily symptoms as subversive, may increase their worry and anxiety accompanied by lower threshold to pain and tolerance. Thereby further aggravation in symptoms and enhancement in disability.

Other factors, such as fear and self-efficacy have gained prominence in the researches related to pain. Fear acts as an impediment in recovery from pain. Fear exacerbates avoidance response and poor behavioral performance, i.e., fear and catastrophization of pain-related symptoms makes the person more disabled, increasing anxiety and high likelihood of avoidant behavior (Crombez, Vlaeyen, Heuts, & Lysens, 1999; Waddell et al., 1993). Self-efficacy is important in controlling pain (Dolce et al, 1986) and robust psychological functioning as it decreases catastrophic thinking (Sodurlund, Sandborgh & Johansson, 2017).

Traditionally, pain is considered as an effect of some physical symptom arising from any injury. But recent researches have documented the role of emotional and cognitive factors in

pain (Turner, Jensen, & Romano, 2000). One such factor is attention which mediates in pain awareness and vigilance. Pain awareness is the state of being aware of pain. It is perception and reaction (at the cognitive level) of chronic pain sufferer to a painful condition. According to psychological model of pain people with chronic pain are disabled because of limited awareness, profound impact of distressing thoughts and negative emotions and avoidant strategies toward pain (McCracken & Eccleston, 2005). Mindfulness-based techniques have been found effective in curbing restricted awareness, emotional distress (Baer & Krietemeyer, 2006). For sustenance of awareness and to derive meaning of pain, continuous monitoring is indispensable to a certain extent.

Pain vigilance is the ability to maintain alertness over longer period of time when experiencing chronic pain. It involves increased level of arousal and anxiety, high sensitivity and responsivity to painful stimuli and persistent monitoring of painful experience. It is based on the perspective that behavior gets affected by the focus of attention (Esteve, Ramirez-Maestre & Lopez-Martinez, 2013). It implies that excessive focus on pain will influence the interpretation of the symptoms and consequently the behavior of the person. This may hamper their participation in healthy routine and activities, leading to maintenance and enhancement in distress and disability (McCracken, 1997). Patients who were high on pain vigilance reported high level of emotional discomfort and intensity of pain (Esteve, Ramirez-Maestre & Lopez-Martinez, 2013). Studies reported the association of pain vigilance with high levels of emotional distress, pain intensity and psycho-social disability (Roelofs et al., 2003). Fluctuations in emotional discomfort and intensity of pain may be a function of pain acceptance as well.

Pain acceptance is an ability to accept that one is in pain. It is an ability to identify that pain is interfering in one's physical and psychological functioning. Acceptance has been emerged as a potential concept of how people respond and adapt to chronic pain (McCracken, Carson, Eccleston, & Keef, 2004). Acceptance of chronic pain involves two behavioral components: pain willingness and activity engagement (Esteve,

Ramirez-Maestre & Lopez-Martinez, 2013). Pain willingness refers to the recognition and understanding that controlling or avoiding pain are not effective coping strategies. This shows that the patient is aware of his/her pain but still engaged continuously in productive or desired activities without giving attempts to control or avoid pain. Activity engagement is related to normal engagement with daily-life routine and activities despite the presence of pain. It requires on the part of patient to indulge in positive and functional activities even while under the influence of pain. Researchers have found that acceptance of chronic pain is associated with depression, disability, pain-related anxiety, and patient physical and vocational functioning (Jacob et al., 1993). Patients with chronic pain overly focus on their pain and attach negative emotions becoming fixed in their thought patterns leading to functional limitations. This cognitive-behavioral model has gained credence over the years specifically its sub-processes of pain acceptance and values (McCracken & Yang, 2006; Viane et al., 2003). Earlier studies have shown convincingly that acceptance of chronic pain is associated with reports of less pain, depression, psychological distress, and physical and psychological disability, as well as more daily uptime (McCracken, 1998; McCracken et al., 1999; Summers et al., 1991). In reference to pediatric pain experience, perception and responses of parents toward pain influences pain perception of children and adolescents (Palermo et al., 2014; Simons et al., 2011), greater pain acceptance by parents is positively associated with greater pain acceptance by children (Smith et al., 2015) accompanied with fear and avoidance (Simons et al., 2015). Studies on psychological interventions like CT and ACT (Niles et al., 2014) were found effective in enhancing adaptive parenting behavior and their mental health (Eccleston, 2016). In general, it was demonstrated that individuals who endorsed higher levels of acceptance of pain were more likely to adaptively respond to pain (Vowles & McCracken, 2010). Adaptive response to pain may also be influenced by pain tolerance.

Pain tolerance is the maximum level of pain that a person is able to tolerate. High pain responsivity is associated with lowered pain

tolerance and seeking emotional support (Lu et al., 2007). Severely injured veterans had high pain tolerance for thermal pain as compared to lightly injured veterans (Dar, Ariely & Frenk, 1995). Different patients have differential ability to tolerate pain. It varies with age, race and sex. Pain tolerance decreases with age and men tolerate more pain than women (Woodrow et al., 1972). Studies have shown that women route to emotion-focused strategies to achieve relief from pain (Rollman et al., 2004) which is detrimental to withstand cold pressor pain (Keefe et al., 2000) and catastrophizing is more common among women (Osman et al., 2000). Pain tolerance varies widely across different cultures as well. It was reported that eastern culture people have higher pain tolerance than those of western culture (Nayak et al., 2000; Khalaf & Callister, 1997). Cultural differences could also be seen in terms of meaning of pain and pain tolerance (Kodiath, 1998). Clinical studies on pain modulation through baroreceptor by means of slow deep breathing indicated that it increases pain tolerance (Sharma et al., 2017) but Sanya and Adebisi (2000) found no relation between specific breathing techniques and pain tolerance.

Researches on cognitive aspect of pain have gained credence over the years (McCracken et al., 2004) and exhibited that pain demands high processing capacity. It has also been shown that patients with chronic pain have limited awareness causing functional limitations (McCracken, 1998). Therefore, if awareness is increased regarding their chronic pain it may alter thought process and consequently may be helpful in pain acceptance and pain tolerance. This may further reduce disability. Keeping this in mind investigators have attempted to test this notion. Thus, in the present study we attempted to assess the relationship among pain awareness, pain vigilance, pain acceptance, and pain tolerance among patients suffering from chronic pain. Secondly, to examine variance of pain awareness and pain vigilance in pain acceptance and pain tolerance. Thus, it was hypothesized that pain awareness and pain vigilance would predict pain acceptance and pain tolerance.

## Method

### Participants

A purposive sample of 100 patients suffering from chronic pain in the age range of 35-55 years, who got admitted for treatment in various hospitals of Delhi were taken. Participants who were suffering from chronic pain for the past one year and doctors have recommended surgery were selected.

### Measures

**Pain Vigilance And Awareness Questionnaire (2003):** The PVAQ was developed by Roelefs et al, as a comprehensive measure of attention to pain and to assess the individual tendency to allocate attention to pain. It has been validated for use in chronic pain and non-clinical samples. The 16 items of the PVAQ are answered on a 6-point Likert-scale anchored never (0) and always (5). Total scores range from 0 to 80, with higher values representing greater vigilance to pain, assess awareness, preoccupation, and observation of pain. The PVAQ demonstrated good internal consistency (Cronbach's  $\alpha = .86$ ) and good test-retest reliability ( $r = 0.80$ ). It has high convergent validity.

**Chronic Pain Acceptance Questionnaire-Revised (Cpaq-R):** CPAQ-revised was developed by McCracken, Vowles and Eccleston. There are 20-items designed to measure acceptance of pain. The acceptance of chronic pain is thought to reduce unsuccessful attempts to avoid or control pain and thus focus on engaging in valued activities and pursuing meaningful goals. There have been 2 factors identified in the CPAQ-Revised: (1) Activity engagement (pursuit of life activities regardless of pain). (2) Pain willingness (recognition that avoidance

and control are often unworkable methods of adapting to chronic pain). The items on the CPAQ are rated on a 7-point scale from 0 (never true) to 6(always true). Higher scores indicate higher levels of acceptance. The CPAQ-Revised demonstrates very good to excellent internal consistency, with alphas of .82 (Activity engagement) and .78 (Pain willingness).

**The West Haven-Yale Multidimensional Pain Inventory (1985):** The inventory was developed by Kerns, Turk and Rudy. It is designed to provide a brief, psychometrically-sound, and comprehensive assessment of the important components of the chronic subjective experience and tolerance of pain. The instrument is recommended for use as part of behavioral and psychological assessment strategies in the evaluation of chronic pain patient's tolerance of their pain. It has 20 items. The 6 general concepts incorporated in part I were: (a) pain severity and suffering; (b) pain-related life interference, including interference with family and marital functioning, work and work-related activities, and social-recreational activities; (c) dissatisfaction with present level of functioning in each of the areas listed in (b); (d) appraisal of support received from spouse, family and significant others; (e) perceived life control, incorporating the perceived ability to solve problems and feelings of personal mastery and competence; and (f) affective distress, including ratings of depressed mood, irritability, and tension. Patient's responses to items are rated on a 0-6 point rating scale. The internal reliability coefficients of all WHYMPI scales range from .70 to .90. The validity of the WHYMPI has been supported by the results of confirmatory and exploratory factor analytic procedures.

**Table 1: Correlation among studied variables**

Variables	Pain Awareness	Pain vigilance	Pain Tolerance	Pain Acceptance
Pain Awareness	1	0.26*	0.47**	0.85**
Pain vigilance	0.26*	1	0.30*	0.28*
Pain Tolerance	0.47**	0.30*	1	0.44**
Pain Acceptance	0.85**	0.28*	0.44**	1

\*\*correlation significant at 0.01 level (2 tailed)

\*correlation significant at 0.05 level (2 tailed)

### Results

Table 1 shows correlation coefficients among studied variables. Results indicate significant positive relationship between pain awareness and pain vigilance ( $r = 0.26$ ;  $p < .05$ ), pain tolerance ( $r = 0.47$ ;  $p < .01$ ) and pain acceptance ( $r = 0.85$ ;  $p < .01$ ).

Significant positive relationship was found between pain vigilance and pain tolerance ( $r = 0.30$ ;  $p < .05$ ), and pain acceptance ( $r = 0.28$ ;  $p < .05$ ). Pain acceptance is positively associated with pain tolerance ( $r = 0.44$ ;  $p < .01$ ).

The above table exhibits the results of multiple regression analysis where dependent variable was pain tolerance. The multiple correlation (R) was found to be 0.44. R square of 0.19 indicates that 19% of the variance in pain tolerance scores is to be accounted for by variable pain awareness. The value of adjusted R was found to be 0.18 which shows that 18% variance in pain tolerance scores is to be explained by combined predictor variables (pain awareness and pain vigilance). The individual contribution of pain awareness is 19%, whereas there is negligible contribution of pain vigilance in pain tolerance scores. Thus, Pain awareness is strongly predicting the criterion variable, pain tolerance. The value of F is 14.07, significant at 0.01 level. This indicates that the R square is statistically significant. The effect of pain awareness was higher as compared to pain vigilance. The t values indicated that pain awareness ( $t = 3.75$ ,  $p < .01$ ,) is significant positive predictor of pain tolerance and pain vigilance is insignificant positive predictor of pain tolerance ( $t = 0.09$ ;  $p > .05$ ). The multiple

regression equation states that every unit increase in pain awareness led to an increase in pain tolerance scores by its coefficient of 0.88

The above table exhibits the results of multiple regression analysis where dependent variable was pain acceptance. The multiple correlation (R) was found to be 0.64 for pain vigilance and 0.71 for pain awareness. The R square of 0.41 indicates that 41% of the variance in pain acceptance scores is to be accounted for by variable pain vigilance and the R Square of 0.51 indicates that 51% of the variance in pain acceptance scores is to be accounted for by variable pain awareness. The value of adjusted R for pain vigilance was found to be 0.40 and the value of adjusted R for pain awareness was found to be 0.50, which shows that 40% variance and 50% variance in pain acceptance scores is to be explained by combined predictor variables (pain vigilance and pain awareness). Results showed that pain vigilance is more strongly predicting the criterion variable whereas pain awareness is also predicting criterion variable but not as strongly as pain vigilance. The significant values of F for pain vigilance are 41.27 and for pain awareness 30.51. This indicates that the R square is statistically significant. The effect of pain vigilance was higher as compared to pain awareness. The t values indicated that pain awareness ( $t = 3.42$ ,  $p < .01$ ,) and pain vigilance ( $t = 6.41$ ;  $p < .01$ ) are significant positive predictors of pain acceptance. The multiple regression equation states that every unit increase in pain awareness led to an increase in pain acceptance scores by its coefficient of 1.43. For every unit increase in pain vigilance lead to increase in pain acceptance scores by its coefficient of 2.11

**Table 2: Stepwise Regression Analysis for Pain Tolerance**

Variables	R	R <sup>2</sup>	Adjusted R	B value	F	t
Pain Awareness	0.44	0.19	0.18	0.41	14.07 $p < 0.01$	3.75 $p < 0.01$

**Table 3: Stepwise Regression Analysis for Pain Acceptance**

Variables	R	R <sup>2</sup>	Adjusted R	B value	F	t
Pain Awareness	0.71	0.51	0.50	1.43	30.52 $p < 0.01$	3.42 $p < 0.01$
Pain Vigilance	0.64	0.41	0.40	2.11	41.13 $p < 0.01$	6.41 $p < 0.01$

### Discussion

Findings of the study revealed that pain awareness strongly predicted pain acceptance and pain tolerance. Higher pain awareness (up to normal level) helps in pain acceptance (that one is in pain) and tolerance. Awareness regarding pain makes the patient alert that the functioning of the body has been damaged which drives the individual to gain knowledge as it is distressing in nature and usual forms of controlling the painful stimuli are not effective, then the individual route himself/herself to understand and acceptance of pain (Rothbaum et al., 1982). Such course of action enhances understanding related to pain and consequent modifications in pain beliefs. This modification in pain beliefs signifies the acceptance of pain and to a certain extent become more tolerant toward pain, as after gaining knowledge worry and anxiety get reduced (to a certain extent). Now, patient becomes more active to alleviate this pain. Researches on pain-related cognitions have shown that chronic pain patients have limited awareness about pain (McCracken, 1998) and may result in enhancement of disability. This is because either people have less knowledge about pain or they do not interpret the pain as noxious. In both the conditions, psychologically avoid the presence of pain and confirm their pain beliefs by giving several explanations to their pain-related symptoms. Devraj et al., (2013) have associated awareness with health literacy. They concluded that patients' limited health literacy has adverse effect on knowledge pertaining to pain medication and this lack of awareness hampered their efforts to find and consult health professionals. Moreover, such patients hesitate to take other forms of treatment. It lowers the tendency of accepting and tolerating the pain. McCracken et al., (2007) found positive relationship between mindfulness and pain-related acceptance. In continuation to McCracken's work (1998) on pain has shown stronger relationship between pain acceptance and physical, social, emotional and cognitive functioning. Studies of pain and attention in laboratory settings have revealed the association between attention and tolerance to nociceptive pain (Kanfer & Goldfoot, 1966). This finding can also be supported by the cognitive theory of anxiety given by Eysenck (1992).

Persistent monitoring of pain (pain vigilance) demands high cognitive processing capacity. Empirical findings have emphasized the role of attention in pain. Preoccupation with attention is associated with perceived pain severity (Melzack & Wall, 1982). According to cognitive model of interruptive function of pain, it is assumed that under the influence of pain attention is directed towards pain. Experimental studies have shown that excessive attention to pain may increase the pain experienced than actual pain (Janssen & Arntz, 1996; Arntz & De Jong, 1993). According to cognitive-behavioral model, under the state of excessive attention (also called hyper-vigilance) chronic pain patient interpret the pain as threatening which in turn may develop fear related to pain. Otherwise, normal levels of attention and anxiety may facilitate in figuring out the pain-related symptoms. This is in agreement with the cognitive theory of anxiety given by Eysenck (1992). It states that normal level of anxiety facilitates early detection of painful stimuli. This in turn may help in the acceptance of pain and some action-oriented measures to alleviate oneself from pain.

### Conclusion

Pain awareness and pain vigilance appear essential in understanding the chronic pain and its behavioral manifestation. The degree of awareness and vigilance may account for understanding of pain, behavioral manifestation and course of action and handling of pain. However, these processes might not be sufficed in completely explaining the suffering related to pain and disability. Tolerance and acceptance have been proposed as processes inter-related to each other and extend the framework of awareness and vigilance, as it influences patient behavior at all levels – physical, emotional, cognitive and social. Studies have shown that acceptance-based treatment is beneficial in greater engagement and lesser interference in routine activities while under the influence of pain (McCracken, 1998).

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