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BRIEF COMMUNICATION

Chronic pain relief after receiving affective touch: A single case report

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Abstract

Affective touch is gentle slow stroking of the skin, which can reduce experimentally induced pain. Our participant, suffering from Parkinson's Disease and chronic pain, received 1 week of non-affective touch and 1 week of affective touch as part of a larger study. Interestingly, after 2 days of receiving affective touch, the participant started to feel less pain. After 7 days, the burning painful sensations fully disappeared. This suggest that affective touch may reduce chronic pain in clinical populations.

KEYWORDS

affective touch, chronic pain, Parkinson's disease

INTRODUCTION

Chronic pain (CP) is defined as ongoing disabling pain that lasts for at least 3 months or beyond its expected time for normal healing. As CP can have various underlying pathophysiological mechanisms, it is difficult to find a suitable treatment (Anwar, 2016). Currently, CP treatment is based on a multimodal approach in which pharmacological, non-pharmacological and physical rehabilitation are combined. Unfortunately, these treatments are often insufficient (Bicket & Mao, 2015). Therefore, it is important to investigate new possible ways to reduce CP, of which affective touch (AT) seems a promising candidate.

Affective Touch is gentle slow stroking of the skin, applied at a speed of 1–10 cm/s (optimally 3 cm/s), that activates a particular type of nerve fibres (C-Tactile afferents; Björnsdotter et al., 2010). Research shows that AT and the underlying C-Tactile system can reduce experimentally induced pain (Meijer et al., 2022; von Mohr et al., 2018). However, only a few studies investigated the effect of AT in CP conditions (Di Lernia et al., 2020; Habig et al., 2021).

This single case study describes a man diagnosed with Parkinson's disease (PD) in 2015 and suffering from CP since 2021. He reported enduring pain relief after receiving AT. This case is unique as it is, as far as we know, the first time the effect of AT on CP is investigated in a longitudinal design. Second, the

participant's pain has fully disappeared after receiving AT, which has not been reported yet. Third, this effect persisted even after AT administration had stopped. Altogether, this case further emphasizes the pain-relieving effect AT might have.

CASE REPORT

The participant was a 73-year-old man, who first reported the CP symptoms to his General Practitioner (GP) in September 2021. At that time, the symptoms were reported as multiple generalized pain symptoms with an unknown cause. The GP subscribed Naproxen pain killers, paracetamol and/or ibuprofen which could be taken if necessary. However, the participant reported that these painkillers were insufficient and caused side effects, therefore, he stopped taking this medication frequently. During the study, the participant did not use any pain medication. Before the start of the study in May 2022, the participant reported pain in his knee and (lower)back. Additionally, he described a 'burning painful sensation' in both hands, where the pain was seemingly more on the 'surface of his skin'. There was no clear trigger for this pain, which was on and off present during the day and sometimes more prominent in one hand compared to the other. As the described burning pain could be a sign of neuropathic pain and therefore might influence touch perception or could even cause allodynia (Jones et al., 2003), before the start of the study the experimenter checked whether the participant could perceive touch and if touch did not elicit an unpleasant experience. The participant could perceive touch and described touch as 'definitely not unpleasant'. Based on this experience and that the participant had not been diagnosed with neuropathic pain, it was decided that the participant was eligible for participating in this study. As part of a larger study protocol, the participant registered his overall pain experience for 1 week which was used as a baseline measurement and to control for normally present pain fluctuation. Hereafter, he received 1 week of non-affective touch (non-AT) treatment followed by 1 week of AT treatment. The specific treatment order for this case was the result of the order being counter-balanced between participants of the larger study. Touch was applied by his partner, who received training which included several demonstrations of both types of touch, a written instruction sheet and a video. Halfway through the week and at the end of the touch week, the experimenter video called the partner and participant to control if touch applications were still done correctly. Touch was applied in the morning and the evening for 15 min on the forearm, in which left and right forearm were alternated between sessions. AT was applied with a speed of around 3 cm/s, which is similar to stroking from elbow to wrist in 6 s. Non-AT was applied with a speed of around 18 cm/s, which is similar to stroking from elbow to wrist in 1 s. Pain experience was measured by the Colour Analogue Scale for pain (CAS) and the Faces Pain Scale-Revised (FPS-R), both range from 0 ('no pain') to 10 ('severe pain'; Scherder & Bouma, 2000). In addition, the pleasantness of both types of touch was registered by a Visual Analogue Scale ranging from 0 ('unpleasant') to 10 ('pleasant'). Both types of touch were rated between 2 and 3, which can be interpreted as 'slightly unpleasant'. However, the participant described the sensation of both types of touch as 'neutral and not painful'. There was no significant difference in pleasantness between AT ($M = 2.06$, SD = .15) and non-AT ($M = 2.63$, SD = .71); $t(6) = -2.43$, $p = .051$.

During the non-AT treatment, the participant reported some changes in pain experience but no clear increase or decrease. After receiving AT for 1 day, the participant started to feel less pain. After 3 days, the participant reported that the burning painful sensation in both his hands had 'fully disappeared', which persisted until the seventh day of the AT week (Figure 1; Table 1).

To determine whether these observed results were significant, the Non-overlap of All Pairs (NAP) method was used. This is a single case analysis method that can be computed by the non-parametric Mann–Whitney *U* test (Morley, 2018; Parker et al., 2011). As this method can only compare two conditions, we used SPSS to conduct three analyses per questionnaire; no touch—AT, no touch—non-AT and AT—non-AT. There was a significant difference between the no touch and AT

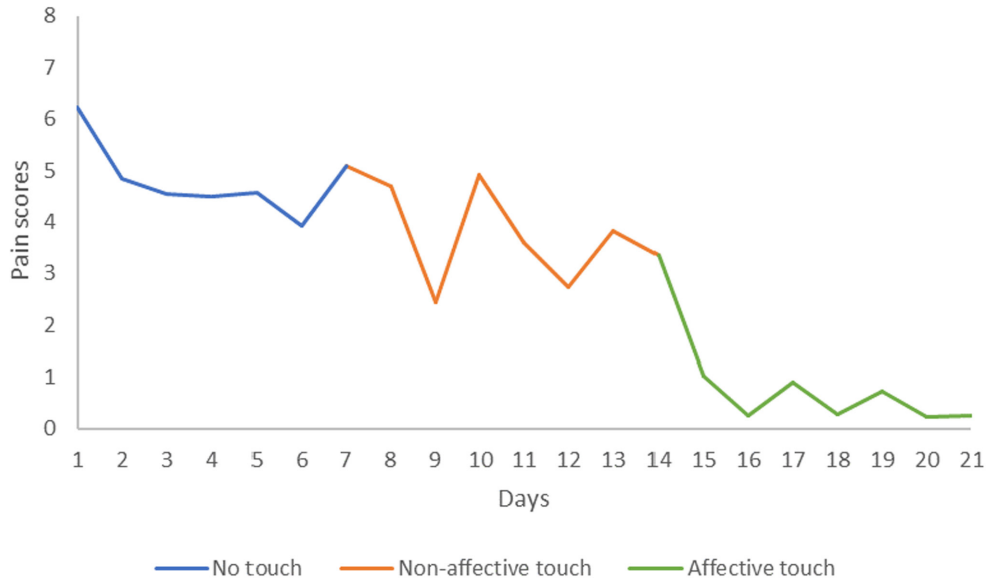

FIGURE 1 Representation of the participants pain experience at each day of the whole experimental cycle. Pain scores represent the combined means of the CAS and FPS-R.

TABLE 1 Mean and standard deviation of pain experience measured by the CAS and FPS-R.

	CAS		FPS-R	
	Mean	**Standard deviation**	**Mean**	**Standard deviation**
No touch	5.18	.59	4.43	.88
Non-AT	3.74	.71	3.55	1.19
AT	.67	.22	.38	.49

condition for both questionnaires. A significant difference between no touch and non-AT was only observed for the CAS but not for the FPS-R. However, the difference between non-AT and the no touch condition is much smaller than for AT and no touch. The standard deviation for non-AT is much larger than for AT (see Table 1), which reflects the fluctuation during the non-AT week as shown in Figure 1. Importantly, there was also a significant difference between the AT and non-AT condition (Table 2).

At the moment of debriefing (2.5 weeks later), the participant subjectively reported that the burning pain was still gone from both his hands, even though they had stopped administering AT after completing the study protocol. The participant and his partner said 'we do not fully understand how this type of touch works but interestingly and somewhat surprisingly the pain is completely gone'. To see whether this pain-relieving effect of AT persisted, the participant was contacted 2 months later; he reported to 'feel no pain in his hands at all' since the end of the study and therefore felt no need to administer AT. The participant did not report any change in pain experience for his knee and lower back. However, the participants described the burning pain in his hands as the most disabling, and as AT effectively reduced this pain, the participant focused on this pain sensation during the experiment. As the follow-up was not part of the study protocol, this was only subjectively reported and not measured with the CAS or FPS-R.

TABLE 2 Results of Mann–Whitney *U* analysis.

	CAS			FPS-R		
	***M* rank**	***Z***	***p****	***M* rank**	***Z***	***p****
No touch—AT	11.00	−3.13	.003	11.00	−3.18	.003
	4.00			4.00		
No touch—non-AT	10.79	−2.95	.003	9.07	−1.42	.418
	4.21			5.93		
AT—non-AT	4.00	−3.14	.003	4.00	−3.17	.003
	11.00			11.00		

*Bonferonni corrected *p*.

DISCUSSION

The results of this single case report are promising as this suggest that AT may reduce pain experience in clinical populations. This is in line with previous research in which CP and specifically neuropathic pain patients report pain relief while receiving AT (Di Lernia et al., 2020). However, this study made use of an experimental setting and touch was applied by a device. In our study, touch is applied by the partner. This has already been reported to enhance the positive effect of AT on pain by von Mohr et al. (2018), but in an experimental setting targeting acute pain instead of CP. Our study provides novel insights as we use a treatment protocol and longitudinal design.

The results are in line with a recent model of Meijer et al. (2022), suggesting that AT interacts with pain processing pathways on different levels of the nervous system resulting in decreased pain experience. As mentioned, CP is caused by several pathophysiological mechanisms. Di Lernia et al. (2020) suggests that AT might be a form of pain analgesia modulating the parasympathetic system, μ-opioid system, oxytocin release and pain processing pathways as also proposed by Meijer et al. (2022). This interaction with several physiological mechanisms might explain its analgesic effect on CP.

However, the burning pain the participant reported could also be a sign of neuropathic pain. Specifically, as the pain was on and off present, described as a burning sensation and touch was experienced as slightly unpleasant, it could be caused by hyperexcitability of the spinal cord (Baron, 2000). As only the pain in the hand diminished, one could speculate that AT interacted with the pain processing more on the peripheral level of the spinal cord by altering the hyperexcitability (Meijer et al., 2022). A more peripheral role for AT is further underlined by the observation that, even though the participant did not perceive AT as pleasant, which is linked to oxytocin release and activation of the insula, it still relieves pain. This suggests that the pain-relieving effect of AT depends more on activity of the underlying C-tactile system than on the pleasant experience of this type of touch (Meijer et al., 2022; von Mohr et al., 2018).

In addition, this is the first study reporting that AT can not only relieve pain immediately, but that this effect persists after the AT application had stopped. Previous research shows that CP in PD is mostly caused by overactivation of the pain system (Antonini et al., 2018). Based on the model of Meijer et al. (2022), the reported persisting effect might suggest that AT modified the overactive pain system to its normal state resulting in permanent pain relief. Furthermore, Di Lernia et al. (2020) suggest that the interaction between AT and CP are linked to interoception. It seems that interoceptive accuracy, that is the ability to correctly perceive the body, is lowered in CP which causes enhanced pain experience. AT, as interoceptive stimulation, might restore the ability to correctly perceive the body in CP.

In contrast, it seems that not only AT influenced pain experience, but non-AT did as well to a certain extent. Even though the participant subjectively did not report any change in pain experience during the non-AT week, at least on one of the questionnaires there is a significant difference with the no touch condition. It could be that being touched is a distraction from the pain. Furthermore, non-AT, as a faster touch more similar to rubbing, activates the Aβ fibres which also seems to

interact with pain on a spinal cord level. However, this is linked to acute pain and reduces pain temporarily (Meijer et al., 2022). This might also explain the fluctuation in pain experience during the non-AT week. However, the significant difference between non-AT and AT further emphasizes that AT, besides a possible distraction from pain, has an additional pain-relieving effect which is persistent.

Overall, this case report shows that AT may be a promising new method to reduce CP in clinical populations. Naturally, as this is a single case report, further research in a larger clinical sample is warranted.

AUTHOR CONTRIBUTIONS

Larissa L. Meijer: Conceptualization; data curation; formal analysis; funding acquisition; methodology; visualization; writing – original draft; writing – review and editing. **Carla Ruis:** Conceptualization; methodology; supervision; writing – original draft; writing – review and editing. **Maarten J. van der Smagt:** Conceptualization; formal analysis; methodology; supervision; writing – original draft; writing – review and editing. **H. Chris Dijkerman:** Conceptualization; formal analysis; funding acquisition; methodology; supervision; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

All authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

INFORMED CONSENT

Our patient signed an informed consent form for publishing this data. The larger study, of which this single case study is part of, has been approved by the Medical Research Ethics Committee UMC Utrecht NL71563.041.20.

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