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## Effect of Acupuncture or Massage on Health-Related Quality of Life of Hemodialysis Patients

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### Abstract

**Objective:** The purpose of this study was to evaluate the effect of acupuncture and massage on health-related quality of life (HR-QOL) among end stage renal disease (ESRD) patients.

**Design:** Pre–post test design.

**Setting:** A hemodialysis (HD) unit located in a university hospital.

**Intervention:** Participants were given the option to choose between 20 min sessions of massage or acupuncture therapy once a week for 8 weeks by licensed acupuncturists and massage therapists while undergoing their usual HD session in the University of California, San Diego Chronic HD unit.

**Outcome measures:** Participants were asked to complete pre- and postintervention surveys, which consisted of the Patient-Reported Outcomes Measurement Information System (PROMIS™) Global Health Short Form and a Generalized Anxiety Disorder 7-item Scale.

**Results:** A total of 101 patients were included in this study. The average age was 57.6 (standard deviation: 14.5) dialysis vintage 7.5 years, 58% patients were male and the most common etiology of ESRD was diabetic nephropathy (45%). Patients had multiple comorbidities as can be expected for this population with the most common being hypertension (94%), diabetes mellitus (53%), and cardiovascular disease (53%).

In this brief intervention study, we were able to find a trend toward improvement in overall HR-QOL as determined by the PROMIS score ( $p=0.08$ ). PROMIS mental raw score improved with intervention, which was statistically significant ( $p=0.034$ ).

**Conclusion:** Use of complementary therapies such as massage and acupuncture during HD may contribute toward improvement of HR-QOL and thus should be considered when addressing overall health status of these patients.

**Keywords:** acupuncture, massage, psychological, anxiety, renal dialysis

### Introduction

END STAGE RENAL DISEASE (ESRD) affects more than 670,000 patients in the United States.<sup>1</sup> The progression to ESRD often results in the development of additional serious comorbidities including depression, anxiety, pain, sexual dysfunction, insomnia, sleep apnea, and restless leg syndrome, which can profoundly impact health-related quality of life (HR-QOL).<sup>2–4</sup> Lifestyle restrictions and modifications required for hemodialysis (HD) may have a detrimental effect on mood. Evidence reports 5%–58% of HD patients experience

depression.<sup>2</sup> Similarly, 12%–52% of patients on HD have anxiety.<sup>2</sup> Causes of depression and anxiety include fluid and diet restrictions, painful fistula cannulation, financial burden, and poor social support among other psychological stress.<sup>5</sup> HD patients suffer from poor sleep quality with 20%–83% reporting sleep disorders.<sup>2</sup> Patients experience fatigue due to accumulation of metabolic waste, anemia, fluid-electrolyte imbalance, depression, and other health-related conditions.<sup>6</sup> Pain is another symptom experienced by dialysis patients. Evidence shows that over 58% of HD patients report pain and 49% rate their pain as moderate or severe.<sup>7</sup> Musculoskeletal

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pain is commonly reported (63.1%), followed by dialysis-associated pain (13.6%), peripheral neuropathy (12.6%), and peripheral vascular disease (9.7%).<sup>8</sup> Chronic pain is associated with disability, insomnia, depression, psychological distress, and lower HR-QOL.<sup>7,9</sup> Moreover, HD patients may have other medical conditions (diabetes mellitus and cardiovascular disease being the most common), which contribute to chronic pain, HR-QOL, and other psychological distress.<sup>7,10,11</sup>

Decreased QOL in patients undergoing HD is a well described problem. Patients on HD have been found to have lower scores than their counterparts on peritoneal dialysis and those who have undergone kidney transplantation.<sup>12</sup> The dialysis outcomes and practice patterns study (DOPPS) by Mapes et al., found that dialysis patients with the lowest scores on three indicators of HR-QOL, namely the physical component summary, mental component summary, and kidney disease component summary, had an adjusted risk of death of 93% and their risk of hospitalization was 56% higher than those with the highest scores.<sup>13</sup>

The control of these symptoms requires a multidisciplinary approach, which may include complementary and alternative medicine (CAM). Acupuncture and massage are complementary nonpharmacological interventions that have been used to manage symptoms of chronic illness and reduce their severity.<sup>14–17</sup> Acupuncture is a popular complementary therapy used to treat various health conditions, chronic pain, and cancer care. It involves using acupuncture needling on body points to improve blood circulation, increase secretion of neurotransmitters, and maintain homeostasis.<sup>18–20</sup> Acupuncture has reduced symptoms of pain, fatigue, nausea, vomiting, depression, anxiety, and improved QOL among patients with HD and other chronic conditions.<sup>14–18,21</sup> Another complementary therapy that has provided health and psychological benefits to patients with chronic illness includes massage. Massage therapy involves the physical act of applying pressure to soft tissue and muscles to provide physiological relief, increase blood circulation, and comfort.<sup>6,22</sup> Studies have shown that massage improved sleep quality, fatigue, pain, and cramps among HD patients.<sup>6,22</sup>

The purpose of this study was to investigate the effect of acupuncture and massage, on HR-QOL measures of physical and psychological distress, life satisfaction, pain severity, fatigue, and mood states among ESRD patients..

## Materials and Methods

### *Design and Setting*

This is a single center study evaluating the impact of short course acupuncture and massage therapy on global health indicators and generalized anxiety in patients with ESRD receiving in-center maintenance HD. Patients were asked to complete two surveys; one before and one at completion of the intervention. The Patient-Reported Outcomes Measurement Information System (PROMIS™) Global Health Short Form survey (Supplementary Data; Supplementary Data are available online at [www.liebertpub.com/acm](http://www.liebertpub.com/acm)) and the Generalized Anxiety Disorder 7-item Scale (GAD-7) were utilized for this purpose (Appendix Table A1). The PROMIS survey evaluates global health and well-being, and asks the patients to rate various aspects of their life such as pain, fatigue, and QOL on a five part scale from poor to excellent. The GAD-7 measures severity of anxiety, and asks patients to

evaluate over the last 2 week period, how often they have been bothered by items such as trouble relaxing, feeling nervous, anxious, or on edge. The responses ranged from “not at all” to “nearly every day.” Surveys were completed at the outpatient HD unit and were anonymous to minimize any negative emotional consequences. Surveys were translated in the patients preferred language via a variety of methods, including certified in person translators, and institutionally approved telephonic and remote video devices. Patients were encouraged to ask as many questions as needed to ensure understanding of the program.

### *Participants*

Patients included in the intervention were 18 years or older, were fully conscious during HD treatments, and received HD three times a week. Patients who were unable to respond to the questionnaire or provide consent were excluded. Patients were provided education on the therapies in the form of a flyer, which included pictures to aid in understanding. In addition, a patient letter outlining the program concept was created and distributed to the patients using similar methods to address language preference. Patients were asked to choose either acupuncture or massage therapy for the 8-week period. Licensed acupuncturists and massage therapists discussed risks, benefits, and alternatives to the intervention, and obtained informed consent for all patients undergoing therapy.

### *Intervention*

Patients received their choice of therapy for 20-min, once a week for an 8-week period while undergoing their routine HD treatments.

### *Acupuncture*

The therapists performed a patient assessment and identified the chief complaint, which ranged from headaches, migraines, neuropathic pain, digestive problems such as bloating and gas, to back and neck pain. Using Chinese medicine, therapists made a differential diagnosis to guide optimal needle placement and stimulate specific points to relieve patient symptoms. Therapists assessed the physiological state of the tongue and the radial pulse strength to determine the most direct and effective location of acupuncture needle placement. For example, a patient complained of neuropathic pain, which was determined to be a branch problem, indicating needle placement between the toes.

### *Massage*

The licensed massage therapists performed a brief patient assessment that included establishing if and where the patients were experiencing any pain. The massage therapy was a combination of Swedish massage, reflexology, and acupressure, and it was performed on either the hands, or the feet and calf of the patient's choice, which are the safest areas to massage without having a full patient medical history. Patients were excluded from receiving massage if they were actively being treated for any extremity deep venous thrombosis, or had any open sores or skin irritation of the affected area. In addition, areas with significant lymphedema were also excluded. Massage was also not performed within four inches of any dialysis tubing or needles. Patients received the massage therapy weekly for 20-min periods. On occasion,

patients would opt out of receiving massage if they were feeling unwell or having complications from their dialysis treatment. Anecdotally, many patients who complained of peripheral neuropathy, stated that the massage therapy was beneficial in improving the sensation in their feet.

#### Statistical analysis

We used descriptive statistics, mean  $\pm$  standard deviation or median, (range), to describe the patient demographics, clinical measures of dialysis and summarize the survey findings. Survey data are anonymous to minimize potential negative emotional impact associated with survey completion. Accordingly, survey data are not matched to individual patients and the analysis was conducted as two independent groups. Individual question responses were compared pre and post using a Fisher's exact test for independent samples. The total raw physical and mental scores from the PROMIS Global Health Short Form were computed and compared pre and postintervention using a student's *t*-test for independent samples. The total score from the Generalized Anxiety 7-item Scale was computed and compared pre and postintervention using a student's *t*-test for independent samples.

#### Results

A total of 108 patients were included in this study. The majority of patients,  $N=80$ , elected for massage and 21 elected for acupuncture. The patient demographics were available for 101 patients and are summarized in Table 1. The average age

was  $57.6 \pm 14.5$  years, with 58% male and the most common etiology of ESRD was diabetes. The average duration of time on HD or dialysis vintage was  $7.5 \pm 8.3$  years. The population of patients had multiple comorbidities with the most common being hypertension, diabetes, cardiovascular disease, and depression.

The individual question scores from the PROMIS Global Health Short Form survey are described in Table 2. Out of the 10 individual questions, an improvement in the rate of satisfaction with social activities and relationships ( $p=0.045$ ) was observed (Table 2).

No statistically significant difference was detected pretest and post-test for GAD-7 individual responses (Table 3). There was no change in PROMIS physical raw score with the mean PROMIS physical raw score  $12.75 \pm 2.87$  before intervention and  $12.84 \pm 2.856$  after intervention (Table 4). There was a significant improvement ( $p=0.034$ ) in the mental raw score after the intervention (Table 4). There was no significant difference in the pre- and post-test scores for the GAD-7 total score ( $p=0.1493$ ).

#### Discussion

We found that the majority of participants chose massage therapy as opposed to acupuncture. Ninety-three percent of our patients undergo dialysis using an arteriovenous fistula for access, which requires dialysis needle placement three times a week and is not a pleasant procedure. It is not surprising then that patients would prefer to avoid additional use of needles. In addition, a large proportion of our patients are Hispanic and literature has demonstrated a low overall use of CAM among Hispanics and preference for massage therapy.<sup>23</sup> Su and Li studied trends in the use of CAM between 2002 and 2007 by racial and ethnic groups and found Hispanics used 42.07% more massage therapy from 2002 to 2007, whereas the use of acupuncture decreased by 5.22% over the same time period.<sup>23</sup>

In our study, we found an increase in global mental health score with the use of complementary therapies, despite the short duration of our study. This score is derived from four individual questions addressing QOL, mental health, satisfaction with social activities, and frequency of feeling anxious, depressed, or irritable. Depression is the most common psychiatric illness in patients with ESRD and it is a significant predictor of mortality in this population.<sup>24</sup> Treatment of depression in chronic dialysis patients is far from optimal. The evidence for antidepressant medication effectiveness in the dialysis population is sparse.<sup>25</sup> A recent study by Hedayati et al. revealed no benefit of treatment with sertraline in patients with nondialysis-dependent chronic kidney disease (CKD).<sup>26</sup> Whether the results of this study can be generalized to other selective serotonin reuptake inhibitors used to treat depression is unknown. It is also unknown whether the results apply to dialysis-dependent CKD patients. We do know, however, that there is need for better and alternative ways to improve mental health in dialysis patients, including nonpharmacological treatment. The chronic dialysis population is unique and quite different from the general population and nondialysis-dependent CKD. The phenomenon of reverse epidemiology in dialysis population is well described, though

TABLE 1. DEMOGRAPHICS OF DIALYSIS POPULATION

Demographics	Mean (SD) or N (%) N=101
Age (years)	57.6 (14.5)
Gender	
Male	59 (58)
Ethnicity	
Caucasian	20 (20)
African American	24 (24)
Asian	13 (13)
Hispanic	41 (41)
Pacific Islander	3 (3)
BMI	27.1 (5.7)
Duration on hemodialysis (years)	7.5 (8.3)
Etiology of ESRD	
Diabetes	45 (45)
Hypertension	6 (6)
Glomerular	16 (16)
Other	34 (34)
Comorbidities	
Cardiovascular disease	54 (53)
Heart failure	25 (25)
Hypertension	95 (94)
Diabetes mellitus	54 (53)
Stroke	7 (7)
Malignancy	14 (14)
Depression	42 (42)
HIV	7 (7)
Liver disease	8 (8)

BMI, body-mass index; ESRD, end stage renal disease; SD, standard deviation.

TABLE 2. PATIENT-REPORTED OUTCOMES MEASUREMENT INFORMATION SYSTEM GLOBAL HEALTH SHORT FORM QUESTION SCORES

Global question responses	Preintervention score N (%)	Postintervention score N (%)	p-Value
<b>Q1</b>			
Poor	9 (8.4)	5 (5.4)	0.077
Fair	32 (29.9)	20 (21.5)	
Good	52 (48.6)	41 (44.1)	
Very good	11 (10.3)	20 (21.5)	
Excellent	3 (2.8)	7 (7.5)	
<b>Q2</b>			
Poor	6 (5.6)	4 (4.3)	0.064
Fair	26 (24.1)	12 (12.9)	
Good	52 (48.1)	40 (43)	
Very good	18 (16.7)	27 (29)	
Excellent	6 (5.6)	10 (10.8)	
<b>Q3</b>			
Poor	12 (11.1)	8 (8.6)	0.197
Fair	34 (31.5)	24 (25.8)	
Good	46 (42.6)	37 (39.8)	
Very good	14 (13)	16 (17.2)	
Excellent	2 (1.8)	8 (8.6)	
<b>Q4</b>			
Poor	5 (4.6)	1 (1.1)	0.115
Fair	13 (11.9)	14 (15.1)	
Good	50 (45.9)	33 (35.5)	
Very good	26 (23.8)	21 (22.6)	
Excellent	15 (13.8)	24 (25.8)	
<b>Q5</b>			
Poor	6 (5.6)	5 (5.4)	0.045
Fair	22 (20.6)	11 (11.8)	
Good	46 (43)	39 (41.9)	
Very good	25 (23.4)	18 (19.4)	
Excellent	8 (7.5)	20 (21.5)	
<b>Q6</b>			
Not at all	16 (14.7)	6 (6.4)	0.367
A little	18 (16.5)	20 (21.3)	
Moderately	32 (29.4)	26 (27.7)	
Mostly	19 (17.4)	17 (18.1)	
Completely	24 (22)	25 (26.6)	
<b>Q7</b>			
Pain score mean (SD)	3.89 (2.64)	3.48 (2.95)	0.314
<b>Q8</b>			
Fatigue score mean (SD)	3.28 (0.99)	3.29 (1.06)	0.931
<b>Q9</b>			
Poor	7 (6.6)	5 (5.3)	0.122
Fair	15 (14.2)	14 (14.9)	
Good	52 (49.1)	35 (37.2)	
Very good	25 (23.6)	23 (24.5)	
Excellent	7 (6.6)	17 (18.1)	
<b>Q10</b>			
Always	2 (1.9)	0 (0)	0.545
Often	7 (6.5)	10 (10.8)	
Sometimes	40 (37)	30 (32.3)	
Rarely	30 (27.8)	24 (25.8)	
Never	29 (26.8)	29 (31.2)	

SD, standard deviation.

not understood.<sup>27</sup> Also, it has been shown that many medications that are beneficial in general population offer no benefit and if anything can be associated with harm in chronic dialysis patients. Complimentary therapies have potential to offer alternative and safe way to improve physical and mental wellbeing in chronic dialysis population.

Hmwe et al. reported significant improvements in depression, anxiety, stress, and general psychological distress among patients who received acupressure, a technique of stimulating acupuncture points using the fingertip instead of the needle.<sup>21</sup> Shariati et al. also found acupressure improved sleep quality in HD patients.<sup>18</sup> Studies of acupuncture conducted in a hospice setting reported patient improvements in QOL, reduced symptoms of pain, fatigue, depression, anxiety, shortness of breath, and enhanced feelings of wellbeing.<sup>14,16</sup> Among cancer patients, acupuncture had a positive effect on nausea, vomiting, pain, sleep quality, anxiety, and QOL.<sup>15,17</sup>

Kim et al. found an improvement in fatigue symptoms in HD patients after receiving acupuncture for 7 weeks.<sup>28</sup> In their study, they administered acupuncture twice a week either on nondialysis days or before undergoing dialysis. They found an improvement in physical functioning as measured by the Kidney Disease Quality of Life-Short Form; however, that change occurred after they continued the therapy for 11 weeks. In our study there was no change in Global Physical Health score with complimentary therapies. This score is derived from five individual questions addressing rate of physical health in everyday physical activities, fatigue, and pain. It is quite plausible that we did not find a significant change in physical functioning due to the short duration (8 weeks) of our study and frequency of the intervention (once a week). A recent study by Kimmel et al. revealed that opioid medication use in chronic dialysis patient is common and associated with increased risk of mortality, dialysis discontinuation, and hospitalization.<sup>29</sup> This study only confirms need for alternative ways to address pain and physical wellbeing in dialysis population.

Massage is a therapeutic touch used for relaxation that can help HD patients overcome fatigue and other sleep disorders. Unal and Balci Akpinar found foot reflexology and back massage reduced fatigue and increased energy in HD patients.<sup>6</sup> The effect of massage therapy in patients on HD has been previously explored, although with different regimens and outcomes measures. Twenty six chronic dialysis participants experienced a significant decrease in the frequency of cramps compared to usual care, including stopping ultrafiltration, after receiving a 20-min massage in the lower extremities during each HD session three times weekly for 2 weeks.<sup>30</sup> A second 3-week massage study of 80 HD participants with restless leg syndrome,<sup>31</sup> a common cause of insomnia and decreased QOL among dialysis patients,<sup>32,33</sup> noted a significant decrease in symptoms. Both studies were limited to symptomatic participants and lower extremity massage. Importantly, these outcomes were secondary and the sample size included small numbers of participants. In contrast, in our study, massage was administered irrespective of the presence of physical symptoms and it was not limited to the lower extremities. Participants were actively involved in the therapy, guiding therapists on whether their pain was general or localized to a specific part of their body and their overall wellbeing goals. As such, our study addresses a different question; does massage therapy

TABLE 3. GENERALIZED ANXIETY DISORDER 7-ITEM SCALE RESULTS

Global question	Preintervention score	Postintervention score	p-Value
1			
Not at all	53 (49.1)	54 (57.4)	0.522
Several days	35 (32.4)	29 (30.9)	
More than half the days	14 (13)	8 (8.5)	
Nearly every day	6 (5.6)	3 (3.2)	
2			
Not at all	57 (52.8)	59 (62.8)	0.188
Several days	34 (31.5)	23 (24.5)	
More than half the days	11 (10.2)	11 (11.7)	
Nearly every day	6 (5.6)	1 (1.1)	
3			
Not at all	55 (51.4)	53 (56.4)	0.683
Several days	36 (33.6)	31 (33)	
More than half the days	10 (9.3)	8 (8.5)	
Nearly every day	6 (5.6)	2 (2.1)	
4			
Not at all	51 (47.2)	53 (57)	0.575
Several days	34 (31.5)	25 (26.9)	
More than half the days	17 (15.7)	11 (11.8)	
Nearly every day	6 (5.6)	4 (4.3)	
5			
Not at all	65 (60.2)	64 (69.6)	0.441
Several days	27 (25)	19 (20.7)	
More than half the days	8 (7.4)	6 (6.5)	
Nearly every day	8 (7.4)	3 (3.3)	
6			
Not at all	54 (50)	52 (55.9)	0.504
Several days	39 (36.1)	34 (36.6)	
More than half the days	10 (9.3)	4 (4.3)	
Nearly every day	5 (4.6)	3 (3.2)	
7			
Not at all	72 (67.3)	65 (69.1)	0.975
Several days	24 (22.4)	20 (21.3)	
More than half the days	7 (6.5)	5 (5.3)	
Nearly every day	4 (3.7)	4 (4.2)	

improve physical and mental wellbeing in patients receiving chronic dialysis?

We did not find a significant difference in the anxiety levels after the intervention likely due to the short inter-

TABLE 4. SUMMARY SCORES FROM PATIENT-REPORTED OUTCOMES MEASUREMENT INFORMATION SYSTEM GLOBAL HEALTH SHORT FORM AND GENERALIZED ANXIETY DISORDER 7-ITEM SCALE

Summary score	Preintervention score mean (SD)	Postintervention score mean (SD)	p-Value
PROMIS physical raw score	12.75 (2.874)	12.84 (2.856)	0.827
PROMIS mental raw score	12.89 (3.038)	13.88 (3.504)	0.034
GAD-7 total score	4.642 (5.06)	3.691 (4.298)	0.1493

GAD-7, Generalized Anxiety Disorder 7-item Scale; PROMIS, Patient-Reported Outcomes Measurement Information System; SD, standard deviation.

vention period. It is also likely that a combination of various interventions is needed to make a meaningful difference in frequency and severity of anxiety in this complex patient population. A recent randomized, controlled, assessor-blinded study using brief mindfulness meditation to address anxiety in HD patients the authors noted an improvement in the GAD-7 scores, however, the findings were not statistically significant.<sup>34</sup> There are a growing number of studies evaluating different approaches to address anxiety among HD patients, beyond pharmacotherapy.

Our study has several strengths. First, the two therapies were administered while the participants were undergoing their routine HD session to avoid scheduling burdens for participants. In the prospective study by Kim et al.,<sup>28</sup> acupuncture was performed either on nondialysis days or before undergoing dialysis, which may not be feasible to sustain for an extended period of time.

Second, the therapies were administered by licensed professionals and tailored to each participant to alleviate their specific symptoms. An unintended benefit that we also noted from this study was that participants expressed an increased overall sense of appreciation due to the additional interaction they had with the therapist during their HD session.

Surprisingly, implementation of the therapies during HD was simple with no interruptions in patient flow. HD staff commented that the unit was quiet with fewer patient complaints. Also, both massage and acupuncture were well tolerated. Most of our patients receive intravenous heparin during dialysis and no bleeding was noted from acupuncture needles.

This study has a number of limitations. It was a single center study and lacked randomization and blinding. We opted to not perform sham acupuncture because it would have been extremely cumbersome to perform while participants were undergoing dialysis. Another limitation of our study was the limited number of sessions provided to the patients. Since these therapies are not reimbursed for HD patients, we were only able to provide one session of massage or acupuncture per week instead of three times weekly based on funding. Consequently, it is uncertain if the effectiveness of these therapies were limited. This study did not differentiate PROMIS and GAD-7 scores by complementary therapy chosen. Both acupuncture and massage therapies were combined in the analysis. We cannot be certain if acupuncture or massage was more effective in reducing symptoms. Another limitation is that we were not able to match the results of the intervention to individual participants but rather the whole unit, since the pre and postsurveys were anonymous.

In summary, HD patients have low HR-QOL and the use of complementary medicine is a promising therapy to address the mental and physical symptoms they experience. Much attention is focused on therapies that prolong life but few address the QOL. No single intervention can address all of the issues our HD patients face and a comprehensive multifocal approach is needed. Complementary therapies including massages and acupuncture have the potential to improve the patient experience during HD and impact the mental wellbeing of our patients. We believe that regular QOL assessment and implementation of strategies to improve QOL should be an essential component of care plan for chronic dialysis patients.

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## Appendix

APPENDIX TABLE A1. GENERALIZED ANXIETY DISORDER 7-ITEM SCALE

<i>Over the last 2 weeks, how often have you been bothered by the following problems? (Use “✓” to indicate your answer)</i>	<i>Not at all</i>	<i>Several days</i>	<i>More than half the days</i>	<i>Nearly every day</i>
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
<i>(For office coding: Total Score</i>	<i>T _____</i>	<i>= _____</i>	<i>+ _____</i>	<i>+ _____)</i>

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