Effects of psychotherapy on quality of life (QoL) among end-stage renal disease (ESRD) patients: A systematic review with meta-analysis

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Abstract

Objective: Patients with end-stage renal disease (ESRD) has experienced poorer quality of life (QoL). The present study aimed to evaluate the effects of psychotherapy on QoL among patients with ESRD.

Methods: We conducted a systematic search for studies in MEDLINE, PubMed, and SAGE Journals databases from inception up to 10 April 2020. The inclusion criteria were studies with randomized controlled trial (RCT) design, patients with kidney disease, published in English language, and had full-text content. Two researchers independently conducted the extraction on the articles among patients with ESRD and also evaluated quality of each study. A random-effects meta-analysis was conducted, and data was presented in weighted mean difference (WMD) with 95% confidence interval (CI).

Results: Eight studies were included in the systematic review and five were entered for meta-analysis. Compared with control group, the intervention group showed a significant difference for QoL, in both physical component summary (PCS) (WMD: 2.52 [95% CI: 0.48, 4.57]) and mental component summary (MCS) (WMD: 4.22 [95% CI: 1.54, 6.89]). The heterogeneity across studies for both PCS and MCS was found to be $I^2 = 0\%$.

Conclusion: The findings support that psychotherapy could improve QoL among patients with ESRD, as compared to control group. Therefore, psychotherapy should be considered as an essential component in improving ESRD patients' health.

Keywords: Psychotherapy, quality of life, ESRD, systematic review, meta-analysis

Background

Quality of life (QoL) refers to an individual's perception of a range of life domains (e.g., physical abilities, mental health, social relationships, sense of life fulfilment) (1-4). In other words, QoL covers how an individual measures the 'goodness' of numerous aspects of his or her life (4).

As a multi-dimensional construct, QoL can be subjective and therefore, it can be measured using different indicators (e.g., health status, personal functioning) (1, 5). Further, instruments created and applied to measure QoL can be divided into three categories (2). Firstly, there are generic instruments for the general population, such as the 36-Item Short Form Health Survey (SF-36) (2, 4, 6). Such tools would assess a wide variety of generic domains (e.g., physical function, energy and vitality) (2). Secondly, there are disease-specific instruments that focus on disease-specific instruments (e.g., Kidney Disease Quality of Life [KDQOL]) (2, 4, 7). Lastly, there are symptom-specific measures that emphasize on symptoms associated with a particular disease and/or treatment (e.g., duration of recovery after a dialysis session) (2).

Thus, QoL can be used to gauge health system performance, mortality indicators, and comparison of health between groups.

QoL has been found to be a consistent and strong predictor of health outcomes among patients suffering with end-stage renal disease (ESRD) (8). The present review focused on adult ESRD patients since renal disease is a serious illness and treatment is challenging and prolonged. It also focused on QoL among patients with ESRD because ESRD is the fifth and final stage of chronic kidney disease (CKD), in which patients are required to undergo lifelong renal replacement therapy (RRT) (e.g., dialysis, kidney transplantation) (9-12). Diabetes and hypertension are two common leading causes of ESRD, and its prevalence ranges between 5% and 8% of the world population (13). Despite the extensive resources committed in treating ESRD and also the significant improvements in the quality of haemodialysis (HD), patients continue to experience significant mortality, morbidity and poor QoL (13, 14). Patients affected by ESRD are in great need to restrict their fluid intake and at the same time, they are at risk of having suboptimal nutrition intake (8). Furthermore, they are at higher risk for developing cardiovascular disease, and the mortality as well as morbidities are high (8, 12, 15). Studies also reported that patients with ESRD could suffer from severe psychological distress (e.g., anxiety, depression) (10, 14). It was reported that depression is very common among ESRD patients and it has been noted to be strongly associated with anxiety (14, 15). They also reported that between those undergoing chronic HD while feeling depressed and those undergoing HD without depression, the former was twice as likely to die or require hospitalization within a year. In addition, the patients with depression were found to be at risk for a 30% increase in both number of hospitalizations and accumulative admission days. Therefore, it could be seen that patients with ESRD experience significant functional impairment and decreased QoL (10, 14).

Since the implementation of HD in the 1960s, almost all nephrologists are aware of the impaired QoL of patients with ESRD (2). Thus, optimising patient care to maximise patients' QoL is a key goal (5). Treatments, including psychological interventions, are increasingly considered to hold the promise in improving QoL among ESRD patients (5, 8, 14, 15). Psychological intervention can be defined as referral to a mental health clinic, introduction or increase dosage of medication (e.g., antidepressant), and/or psychotherapy (14). In regard to medication, limited data on its safety and efficacy among ESRD patients were found (14, 15). Also, prescription of certain drugs should be observed as they might lead to adverse side effects (e.g., high dose of benzodiazepines could cause sedation) (16).

On the other hand, a variety of psychological interventions have been explored to assess their efficacy in increasing QoL (14). Some examples include cognitive-behavioural therapy (CBT) and exercise therapy (15, 17). Past literature discovered that CBT could be beneficial in improving QoL among those affected by ESRD (15, 17, 18). Further, the patients also reported reduced emotional distress (e.g., depression) and increased adherence to fluid restrictions. As for exercise therapy, mixed results were reported (15). While some studies displayed efficacy of such therapy (18, 19), other studies revealed no significant changes (20, 21). Hence, it can be seen that there is no definite answer when it comes to effects of psychotherapy in improving QoL among ESRD patients.

Attention to and focus on QoL is demonstrated through the growing number of studies on QoL (22). However, limited information and researches on psychotherapy and quality of life among the targeted population are still found (8, 23). Also, to the current authors' knowledge, no systematic reviews and meta-analyses on the effects of psychotherapy on QoL in ESRD patients are discovered. Therefore, in the present study, a systematic review and meta-analysis were carried out to examine the effects of psychotherapy on QoL among patients with ESRD.

Methods

Protocol registration

This present review was registered and approved in the National Medical Research Register (NMRR) (NMRR ID number: NMRR-20-881-54565) and Sunway Medical Centre Independent Research Ethics Committee (SREC) (SREC ID number: SREC 005/2017/ER). It was conducted on the basis of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (24).

Literature search

Two investigators (K.P. and A.D.N.) independently conducted an electronic search for potential studies via MEDLINE, PubMed, and SAGE Journals on 10 April 2020. Potential studies included relevant studies that were published in journals from inception to 10 April 2020.

Search strategies

The search term combinations used were: (psychotherap* OR cognitive therap* OR cognitive psychotherap* OR brief psychotherap* or short*term psychotherap* OR group psychotherap* OR psychodynamic psychotherap* OR rational psychotherap* OR rational*emotive psychotherap*) AND (quality of life OR health*related quality of life) AND (kidney disease OR chronic kidney disease OR renal insufficiency OR chronic renal insufficiency OR kidney failure OR chronic kidney failure OR renal disease OR chronic renal disease OR end*stage renal disease). The search strategies are presented in Appendix 1.

Intervention and control group definitions

The intervention group referred to participants who received and attended any forms of psychotherapy during the intervention period. The control group referred to participants who

did not receive any forms of psychotherapy during the intervention period or did not receive any forms of psychotherapy after the intervention period.

Study screening

Relevant studies that were identified through the databases were imported into Mendeley 1.19.4. Any duplicates were removed. Next, the titles and abstracts of the remaining articles were screened based on the search strategies. Upon screening, full-text articles were assessed based on the inclusion criteria mentioned below. In addition, reverse-forward citation tracking was conducted manually from the identified studies. All steps were independently carried out by two investigators (K.P. and A.D.N.). If any discrepancies on included studies were found between two investigators (K.P. and A.D.N), discussion was held and resolved by the senior authors (K.W.L. and P.B.O.) for final consensus before the full text of each relevant article was reviewed.

Study selection

Studies with randomized controlled trial (RCT) design were included into the present study. The studies also had to include patients with ESRD. Further, the studies must be published in English language. Lastly, full-text content must be available for the current paper. Studies that did not meet these criteria were excluded.

Data extraction

The characteristics of the selected studies were extracted as follows: Last name of first author, year of publication, country, sample size, mean age $\pm$ SD, gender, kidney disease stage, measure/s, type of intervention, duration of intervention, information from intervention and control groups (baseline mean $\pm$ SD, final mean $\pm$ SD, and mean difference $\pm$ SD), p-value for difference in mean change between the two groups, and risk of bias. Two investigators (K.P.

and A.A.A.L.) extracted the data individually, and differences were resolved through discussion with the third and fourth investigators (K.W.L. and P.B.O.).

Statistical analysis

Mean differences in quality of life between groups were calculated using random-effects meta-analysis. This was carried out using Review Manager 5 (RevMan 5.3) (25), whereby WMD, with 95% confidence interval (CI), were calculated with a two-tailed p-value of <0.05, which was considered as statistically significant. To assess heterogeneity between the studies, I^2 index was examined. Besides that, publication bias was assessed using funnel plots, Egger's test and Begg's test via Meta-Essentials (26).

Risk of bias assessment

Two reviewers (K.P. and A.A.A.L.) used the Revised Cochrane risk-of-bias tool for randomized trials (RoB 2) to independently assess the risk of bias within each study (27). All sources of bias (e.g., randomization process, deviations from intended interventions, missing outcome data, measurement of the outcome, selection of the reported result) were evaluated accordingly. Any differences were discussed and resolved with the third and fourth investigators (K.W.L. and P.B.O.).

Results

Description of included studies

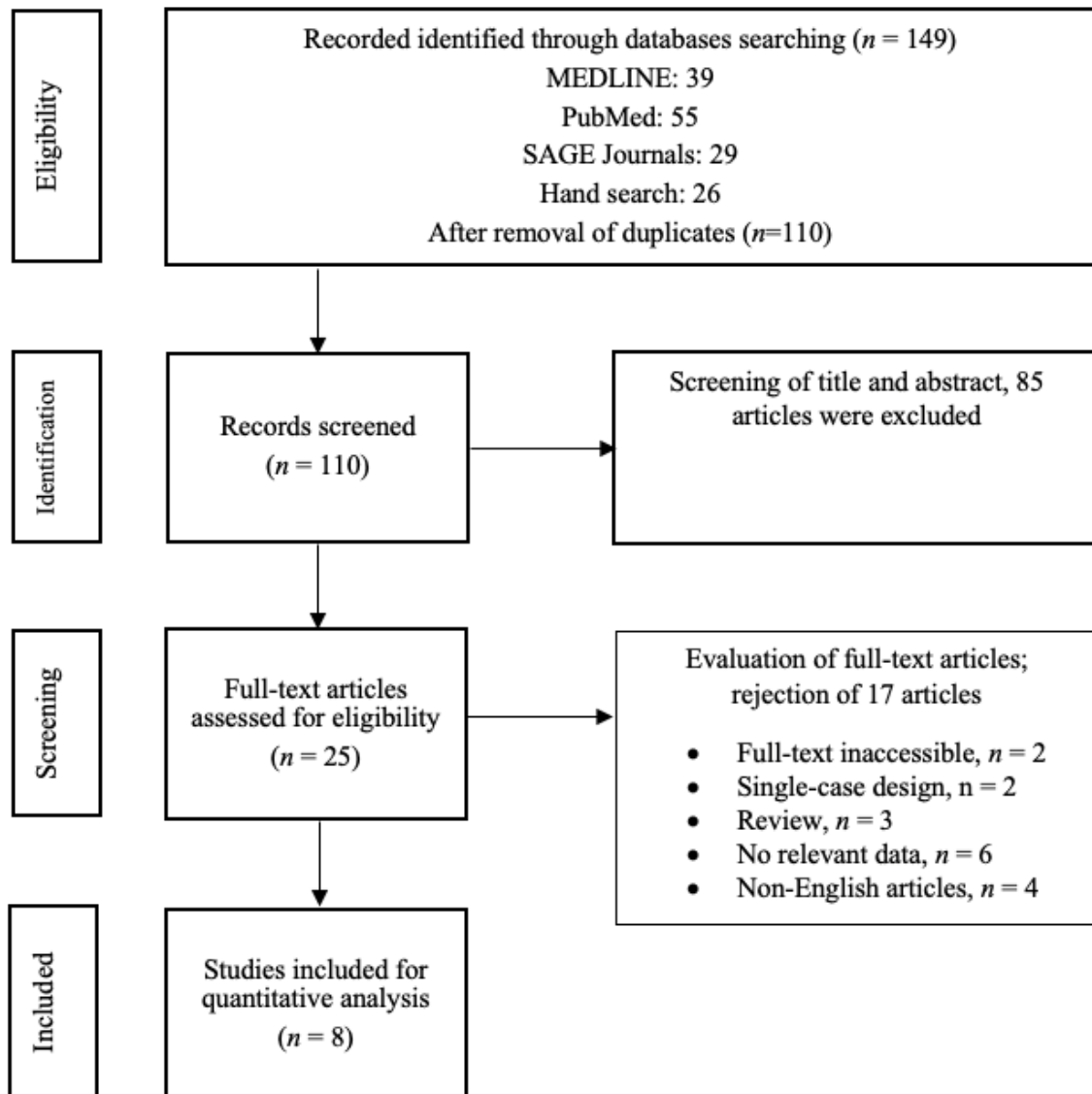The literature search and selection process are presented in Figure 1.

Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram of the literature screening process.

From the literature search, 149 articles were identified in the initial screening. After removing 39 duplicate articles, a total of 110 studies were retrieved to review the titles and abstracts. From there, 25 studies were eligible to undergo full-text assessment for inclusion criteria. After comprehensive evaluation of these articles, 8 studies were eligible for systematic review and meta-analysis.

Characteristics of included studies

The characteristics of the eight studies are summarized in Table 1.

Table 1: Characteristics of the included studies.

Author	Year	Country	Sample size	Mean age ± SD		Gender		Measure/s	Type of intervention	Duration of intervention	QoL (PCS)				QoL (MCS)				p-value (between groups)		Risk of bias
				Intervention group	Control group	Male	Female				Intervention group		Control group		Intervention group		Control group		PCS	MCS	
											Mean difference ± SD	p-value	Mean difference ± SD	p-value	Mean difference ± SD	p-value	Mean difference ± SD	p-value			
Cukor et al. (28)	2014	USA	65	N/A	N/A	47	18	KDQOL-SF	CBT	3 months	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Low risk
Duarte et al. (29)	2009	Brazil	85	52.4 ± 15.9	54.0 ± 12.7	35	50	KDQOL-SF	CBT	3 months	1 ± 9.6	.58	-0.80 ± 8.8	.60	9.9 ± 12.3	< .001	-1.8 ± 11.7	.45	.24	.002	Some concerns
Erdley-Kass et al. (30)	2018	USA	33	72.27 ± 5.62	75.33 ± 8.29	21	12	KDQOL-36	PST	1.5 months	3.02 ± 11.07	N/A	-1.57 ± 8.53	N/A	10.41 ± 10.23	N/A	-0.81 ± 9.72	N/A	.27	.020	Low risk
Ghadam et al. (31)	2016	Iran	50	N/A	N/A	26	24	Ferrans and Powers Quality of Life Questionnaire	Self-care education	2 months	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	High risk
Lii et al. (32)	2007	Taiwan	48	N/A	N/A	23	25	SF-36	CBT, self-efficacy theory	2 months	2.55 ± 6.67	N/A	-2.96 ± 6.76	N/A	3.52 ± 7.38	N/A	0.25 ± 9.05	N/A	.008	.19	Low risk
Moattari et al. (33)	2012	Iran	48	38.56 ± 11.4	37.3 ± 12.79	31	17	Ferrans and Powers Quality of Life Questionnaire	Empowerment intervention	1.5 months	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Some concerns
Rodrigue et al. (34)	2011	USA	62	53.2 ± 11.1	52.7 ± 12.7	29	33	QOLI, SF-36	QOLT	2 months	-0.1 ± 6.2	N/A	-1.7 ± 10.4	N/A	5.5 ± 9.6	N/A	0.4 ± 15.3	N/A	.36	.13	Low risk
Tsay et al. (35)	2005	Taiwan	57	50.72 ± 14.10		27	30	SF-36	ATP	2 months	2.97 ± 5.79	.02	-3.37 ± 9.9	.01	8.5 ± 7.23	.001	0.67 ± 11.94	.69	.001	.020	Low risk

SD: standard deviation; QoL: quality of life; PCS: physical component summary; MCS: mental component summary; N/A: not available; KDQOL-SF: Kidney Disease Quality of Life Short Form; KDQOL-36: Kidney Disease Quality of Life; SF-36: 36-Item Short Form Health Survey; QOLI: Quality of Life Inventory; CBT: cognitive-behavioural therapy; PST: problem-solving therapy; QOLT: quality of life therapy; ATP: adaptation training programme.

A total of 448 kidney disease patients were included in the current systematic review and meta-analysis. From these studies, three studies were carried out in the USA (28-30), two studies were conducted in Taiwan (31, 32), another two were conducted in Iran (33, 34), and one was carried out in Brazil (35). It was found that only five studies reported the mean age and SD of the participants (18, 29, 30, 34, 35). A little over the half of the participants were males ($n = 239$) as compared to females ($n = 209$).

In regard to the measures used to assess QoL, the SF-36 was commonly used (30-32), followed by the KDQOL-SF (28, 35), Ferrans and Powers Quality of Life Questionnaire (33, 34), KDQOL-36 (29), and Quality of Life Inventory (QOLI) (30). It was reported that three studies applied CBT (28, 31, 35) while other studies conducted problem-solving therapy (PST) (29), self-care education (33), empowerment intervention (34), quality of life therapy (QOLT) (30), and adaptation training programme (ATP) (32) respectively. In addition, in half of the studies, the average duration of intervention was two months (30-33).

In this current paper, only five studies (29-32, 35) were included for meta-analysis. Specifically, the mean differences in physical component summary (PCS) and mental component summary (MCS) scores from the KDQOL-SF, KDQOL-36, and SF-36 were examined to attain a direct picture of QoL. These subscale outcomes were selected because previous studies found a significant relationship between these subscale scores and their respective patient outcomes (7, 29, 36, 37). Furthermore, factor analysis studies have demonstrated two distinct groupings for QoL, namely the PCS and MCS (32, 38).

Effects of psychotherapy on quality of life and its subgroup analysis

The effect of psychotherapy on QoL by PCS and MCS subgroup analysis are presented in Figure 2 and 3.
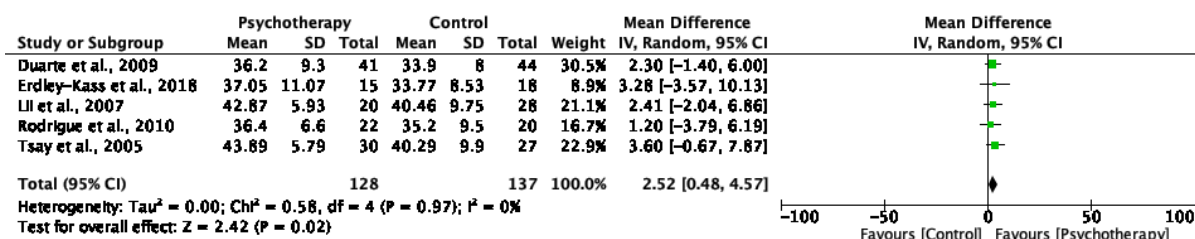
Study or Subgroup	Psychotherapy Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Duarte et al., 2009	36.2	9.3	41	33.9	8	44	30.5%	2.30 [-1.40, 6.00]
Erdley-Kass et al., 2018	37.05	11.07	15	33.77	8.53	18	8.9%	3.28 [-3.57, 10.13]
Lil et al., 2007	42.87	5.93	20	40.46	9.75	28	21.1%	2.41 [-2.04, 6.86]
Rodrigue et al., 2010	36.4	6.6	22	35.2	9.5	20	16.7%	1.20 [-3.79, 6.19]
Tsay et al., 2005	43.89	5.79	30	40.29	9.9	27	22.9%	3.60 [-0.67, 7.87]
Total (95% CI)			**128**			**137**	**100.0%**	**2.52 [0.48, 4.57]**

Heterogeneity: Tau² = 0.00; Chi² = 0.58, df = 4 (P = 0.97); I² = 0%
Test for overall effect: Z = 2.42 (P = 0.02)

Figure 2: Forest plot of the effects of psychotherapy on QoL (PCS) among ESRD patients.

Study or Subgroup	Psychotherapy Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Duarte et al., 2009	47.3	12.1	41	39.3	11.9	26	20.7%	8.00 [2.11, 13.89]
Erdley-Kass et al., 2018	54.1	10.23	15	51.39	9.72	18	15.3%	2.71 [-4.14, 9.56]
Lil et al., 2007	43.49	7.49	20	40.1	12.13	28	23.1%	3.39 [-2.17, 8.95]
Rodrigue et al., 2010	46.2	11.3	22	42.8	12	20	14.3%	3.40 [-3.67, 10.47]
Tsay et al., 2005	43.98	7.23	30	40.68	11.94	27	26.6%	3.30 [-1.89, 8.49]
Total (95% CI)			**128**			**119**	**100.0%**	**4.22 [1.54, 6.89]**

Heterogeneity: Tau² = 0.00; Chi² = 2.03, df = 4 (P = 0.73); I² = 0%
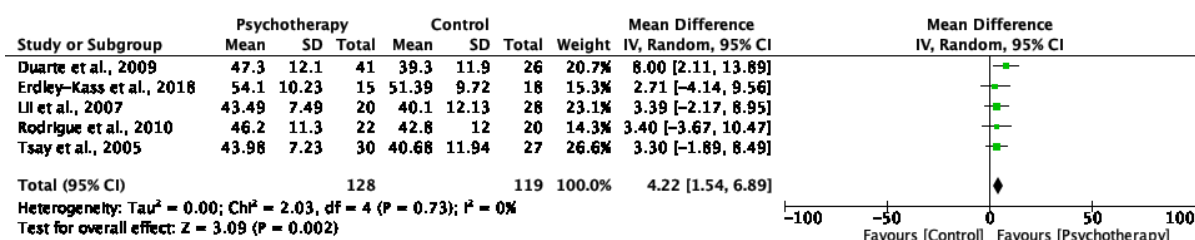Test for overall effect: Z = 3.09 (P = 0.002)

Figure 3: Forest plot of the effects of psychotherapy on QoL (MCS) among ESRD patients.

A statistically significant improvement in QoL (PCS) was observed in those received psychotherapy as compared to those in placebo group (WMD = 2.52, 95% CI = 0.48, 4.57) among all participants. Similar results were also seen in QoL (MCS) with WMD = 4.22, 95% CI = 1.54, 6.89).

For both PCS and MCS, the heterogeneity of the studies was found to be $I^2 = 0\%$.

Risk of bias within studies

The risk of bias was examined under five domains, including randomization process, deviations from intended interventions, missing outcome data, measurement of the outcome, and selection of the reported result. The results are shown in Appendices 2 and 3.

All included studies were randomized controlled trials, and all studies seem to raise low risk of bias from the randomization process because the allocation sequence was carried out randomly and the baseline differences between groups did not seem to suggest a problem from it. One study had high risk of bias to deviation from intended intervention (33). This was due to the researcher being aware of the treatments assigned to the participants, whereby the

researcher conducted the face-to-face education group session. Next, low risk bias was reported for the domain of missing outcome data as the outcome data were available for all participants. As for measurement of the outcome, one study was revealed to display high risk of bias, due to both the researcher and co-researcher assisting in completing the demographic questionnaire and assessment checklist of the participants (33). Lastly, for selection of the reported result, some concerns were raised in two studies, in which there was no information on whether the numerical results were selected from multiple eligible analyses of the data or not (34, 35). Meanwhile, one study was at high risk because there was lack of information on whether the data was analysed in accordance with the pre-specified analysis plan or not, considering that only the p-value was reported (33). Further, no information was found on whether the numerical results were selected from multiple eligible analyses of the data or not. With that said, overall, five studies were found to be at low risk of bias (28-32), two were reported with some concerns (34, 35), and one was at high risk (33).

Publication bias analysis

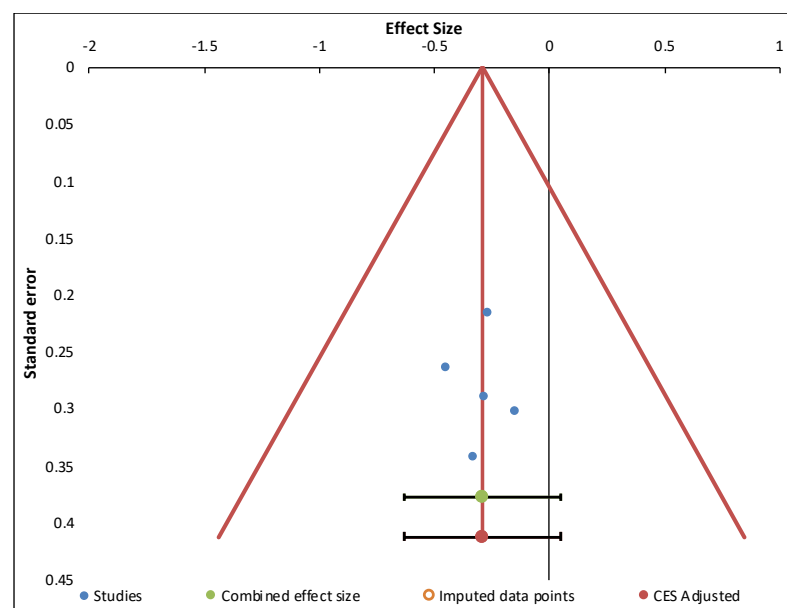The funnel plots of studies are shown in Figures 4 and 5.

Figure 4. Funnel plot of studies evaluating the effects of psychotherapy on QoL (PCS) among ESRD patients.
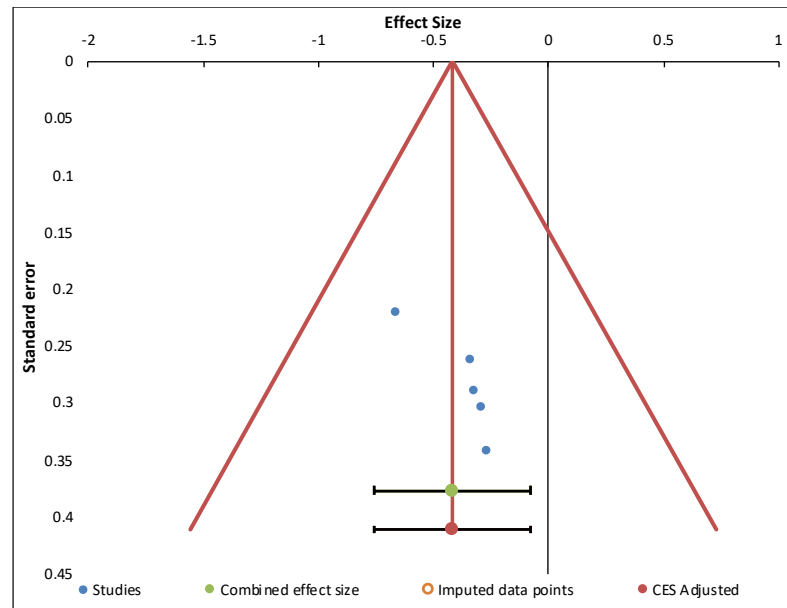
Figure 5. Funnel plot of studies evaluating the effects of psychotherapy on QoL (MCS) among ESRD patients.

For PCS, from the funnel plot, Egger's test ($p = .95$) and Begg's test ($p = 1.00$) suggested that there was no publication bias seen among studies. As for MCS, as seen from the asymmetrical funnel plot, Egger's test ($p = .041$) and Begg's test ($p = .014$) were significant, suggesting that there was publication bias. Such results would also mean that significant asymmetry was found, and the results derived should be considered cautiously.

Discussion

The current study aimed to assess the effects of psychotherapy on QoL among ESRD patients through meta-analysis and systematic review.

From the meta-analysis of the selected five studies (29-32, 35), it was found that QoL (PCS and MCS) differed significantly between those who received psychotherapy and those who did not. In other words, patients who attended psychotherapy displayed an overall significant increase of QoL compared to those who did not. As the results suggested, psychotherapy plays an important role in improving the QoL among patients with ESRD. This

includes improved physical and mental health aspects, as derived from the PCS and MCS respectively (29). Past literature highlighted that those affected with ESRD are often negatively impacted, both physically (e.g., increased rates of hospitalizations) and psychologically (e.g., more depressed) (10, 14, 29). When psychotherapy is encouraged, it attempts to incorporate cognitive restructuring and behavioural assignments (14, 15, 39, 40). Thus, changing distorted thinking and acting towards positive change seem plausible in improving QoL (physically and mentally) among the patients (14, 15, 17, 18). Such improvements have also been observed from the present meta-analysis (29-32, 35).

From the meta-analysis, it was discovered that ESRD patients benefited the most from ATP when it came to improving PCS (32). Applying the transactional theory of stress and coping (41) and CBT (39), this program included patient education, cognitive behaviour modification, problem-solving, and stress management (32). The goal of ATP was to increase the patients' sense of competence and mastery, which in turn could reinforce the development of constructive coping strategies. A possible reason for its efficacy in improving QoL (as compared to other psychotherapies for PCS) could be that physical difficulties were mainly reported and managed in this study. These symptoms included restrictions on fluid intake, length of dialysis treatment, loss of bodily function, transport difficulties, and limitation of physical activities. As mentioned earlier, physical symptoms have been one of the main hurdles encountered by patients with ESRD (8). The psychological aspect would come in when the patients had distorted views on these stressors and hence, restricting the ability to cope with the difficulties effectively (32). With ATP, aside from teaching them to appraise stressors appropriately, the patients were also educated on factual knowledge about the disease process, together with coping strategies to manage the physical difficulties faced. With better cognitive restructuring and coping skills, these allowed the patients to adapt better to ESRD and thus, improving their QoL, including the PCS.

On the other hand, CBT was reported to significantly fare better in the MCS compared to other types of psychotherapy (28, 31, 35). Among ESRD patients, there is a tendency for them to develop distorted thinking (e.g., magnification), which could lead to negative emotions (e.g., feeling depressed), and maladaptive behaviour (e.g., reduced fluid adherence) (15, 35, 40). CBT is a structured psychotherapy that aims to address and manage these concerns (15, 35, 39, 40). During therapy, the patients were encouraged to talk about their thoughts, identify and restructure distorted thoughts, apply coping strategies (35, 39). In all three studies (28, 31, 35), improvements in QoL (e.g., MCS) was evident. The patients reported improved pessimistic and negative thinking, whereby they were trained to apply positive thinking to alter pessimistic and negative thinking. With that, their emotions were more relaxed.

Overall, psychotherapy was found to be useful in improving QoL among ESRD patients. Further, different aspects of QoL (e.g., PCS, MCS) were reported to be influenced by the types of psychotherapy used. For instance, ATP seems to benefit more in improving PCS (32) while CBT seems to favour more in improving MCS (31, 35).

Implications of this study

The results of the present study intend to contribute the positive effects of psychotherapy in improving MCS among patients with ESRD. It is indicated that healthcare providers should plan and implement programs that comprises of or integrates psychotherapy (5, 8, 14, 15). As mentioned previously, RRT is commonly applied in treating kidney disease (9-12). Hence, it could be implied that psychotherapy is not highly emphasized among these population and that the addition of psychotherapy should be fortified. In addition, healthcare providers should also take note on improving patients' attendance for psychotherapy, such as enhancing therapeutic alliance, offering convenient appointments, and providing reminders (42). This could allow room for patients to benefit from psychotherapy and thus, improving their QoL.

Clinical significance of this study

Of the five studies used in meta-analysis, two studies used CBT (31, 35), while other studies used PST, QOLT, and ATP respectively (29, 30, 32). For the PCS, ATP was found to produce the highest mean difference (mean difference = 3.60) (32), followed by PST (mean difference = 3.28) (29), CBT (mean difference = 2.41; 2.30) (31, 35), and QOLT (mean difference = 1.20) (30). As for the MCS, the highest mean difference was found when CBT was applied (mean difference = 8.00) (35), followed by QOLT (mean difference = 3.40) (30), ATP (mean difference = 3.30) (32), and PST (mean difference = 2.71) (29). In addition, in another study, when CBT was used, the mean difference generated was 3.39 (31).

Based on the results obtained, it was indicated that psychotherapy could improve both PCS and MCS in QoL. Further, a bigger impact was seen in the MCS as compared with PCS, suggesting that psychotherapy seemed to be more beneficial in improving mental health than physical health.

As previously mentioned, ESRD patients frequently encounter a number of physical hurdles, such as fluid intake restrictions, dialysis treatment duration, and physical activity limitation (8). As ATP aims to improve their sense of competence and mastery, this assists in reinforcing the development of effective coping strategies. Better cognitive restructuring and coping skills could allow better adaption and thus, improving the patients' QoL, including the PCS (32). With that said, ATP may be recommended as an intervention in promoting PCS among this population.

As for MCS, it was observed that CBT seemed to fare better in improving MCS. Past literature revealed that ESRD patients tend to develop distorted thinking, leading to negative effects and unhealthy coping behaviour (15, 35, 40). With CBT, it aims to highlight and manage these issues (15, 35, 39, 40). By undergoing cognitive restructuring and better coping strategies,

these could lead to improvement in emotions too. Moreover, past studies found benefits for QoL, including MCS (28, 31, 35). With this evidence, CBT would be common and suitable in addressing mental health concerns among patients with ESRD.

Strength and limitations

To the authors' knowledge, this is the first meta-analysis to examine the effects of psychotherapy on quality of life among kidney disease patients. In addition, a significant difference between the intervention and control groups was discovered, in which the former benefited more compared to the latter.

Several limitations were identified. Firstly, it was noticed that the tools used in measuring QoL varied across studies. Further, different approaches were applied in measuring QoL, such as total scores (28, 30, 33, 34), a number of dimensions (e.g., Social-Economical, Family) (33-35), and also as PCS and MCS (29-32, 35). PCS and MCS were selected in the present paper because past studies discovered a significant relationship between these subscale scores and their respective outcomes (7, 29, 36, 37). In addition, factor analysis studies established two distinct groupings for QoL, namely the PCS and MCS (32, 38). Hence, not all studies could be included into the meta-analysis.

Besides that, data of the present study were limited to a few countries, including USA, Taiwan, Iran, and Brazil. In addition, studies from Iran were excluded from meta-analysis (33, 34). With that said, cross-cultural generalization would be difficult and hence, the results should be interpreted with caution. In addition, this review only included studies in English or at least with English abstract. We also did not include non-published materials which did not go through stringent peer reviewed process. We may have difficulties to comprehend and assess non-English studies and any further translation exercise may affect its' validity.

Notwithstanding with these limitations, we found statistically significant improvement of QoL in those receiving psychotherapy compared to those in control group.

Conclusion

The current systematic review and meta-analysis found significant improvement of QOL using psychotherapy among patients with ESRD. Healthcare providers should continue to promote inclusion of psychotherapy as part of their treatment plan for the target population. Future studies should also explore this area further with a more diverse population, which could allow broader understanding and sufficient information for future clinical practice.

Abbreviations

ATP: adaptation training programme

CBT: cognitive-behavioural therapy

CI: confidence interval

CKD: chromic kidney disease

ESRD: end-stage renal disease

HD: haemodialysis

KDQOL: Kidney Disease Quality of Life

KDQOL-36: Kidney Disease Quality of Life

MCS: mental component summary

NMRR: National Medical Research Register

PCS: physical component summary

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

PST: problem-solving therapy

RCT: randomized controlled trial

RoB 2: Revised Cochrane risk-of-bias tool for randomized trials

RRT: renal replacement therapy

QoL: quality of life

QOLI: Quality of Life Inventory

QOLT: quality of life therapy

SD: standard deviation

SF-36: 36-Item Short Form Health Survey

SREC: Sunway Medical Centre Independent Research Ethics Committee

WMD: weighted mean difference

Declaration

Ethics approval

Funding

Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

KP conducted the search process, study selection, data extraction, risk of bias assessment, data analysis, and was a major contributor in the write-up of the manuscript. AAAL conducted a separate data extraction and risk of bias assessment. KWL and PBO contributed in resolving

discrepancies raised by KP and AAAL, when necessary. KWL, PBO, and SMC helped in revising the manuscript. All authors read and approved the final manuscript.

Conflict of interests

The authors declare that they have no competing interests.

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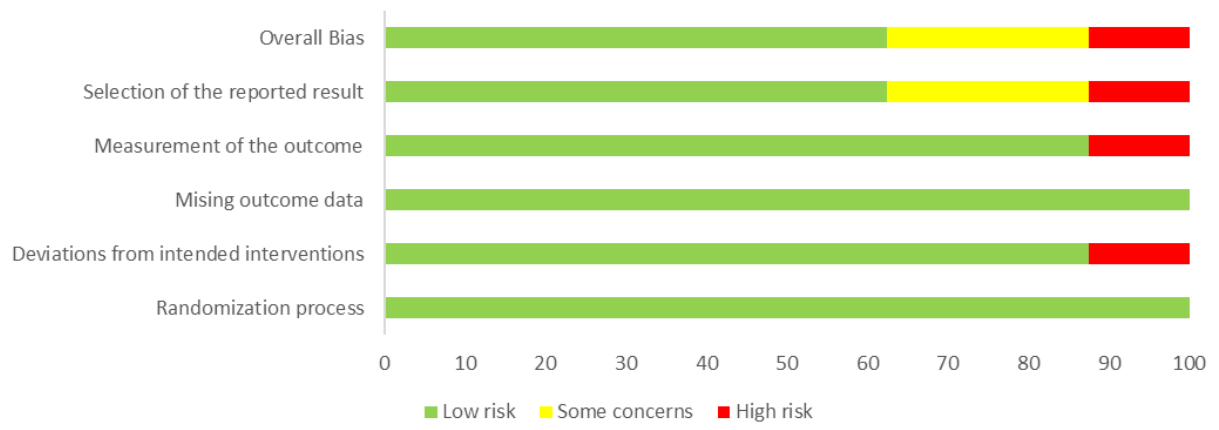41.   Lazarus RS, Folkman S. Stress, appraisal, and coping: Springer publishing company; 1984.

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Appendix 1: Search terms used for final search on 10 April 2020.

Searches	Search terms	MEDLINE	PubMed	SAGE Journals
#1	psychotherap* OR cognitive therap* OR cognitive psychotherap* OR brief psychotherap* or short*term psychotherap* OR group psychotherap* OR psychodynamic psychotherap* OR rational psychotherap* OR rational*emotive psychotherap*	120,007	120,357	461
#2	quality of life OR health*related quality of life	336,377	392,729	561,183
#3	kidney disease OR chronic kidney disease OR renal insufficiency OR chronic renal insufficiency OR kidney failure OR chronic kidney failure OR renal disease OR chronic renal disease OR end*stage renal disease	307,850	702,654	23,184
#4	#1 AND #2 AND #3 (psychotherap* OR cognitive therap* OR cognitive psychotherap* OR brief psychotherap* or short*term psychotherap* OR group psychotherap* OR psychodynamic psychotherap* OR rational psychotherap* OR rational*emotive psychotherap*) AND (quality of life OR health*related quality of life) AND (kidney disease OR chronic kidney disease OR renal insufficiency OR chronic renal insufficiency OR kidney failure OR chronic kidney failure OR renal disease OR chronic renal disease OR end*stage renal disease)	39	55	29
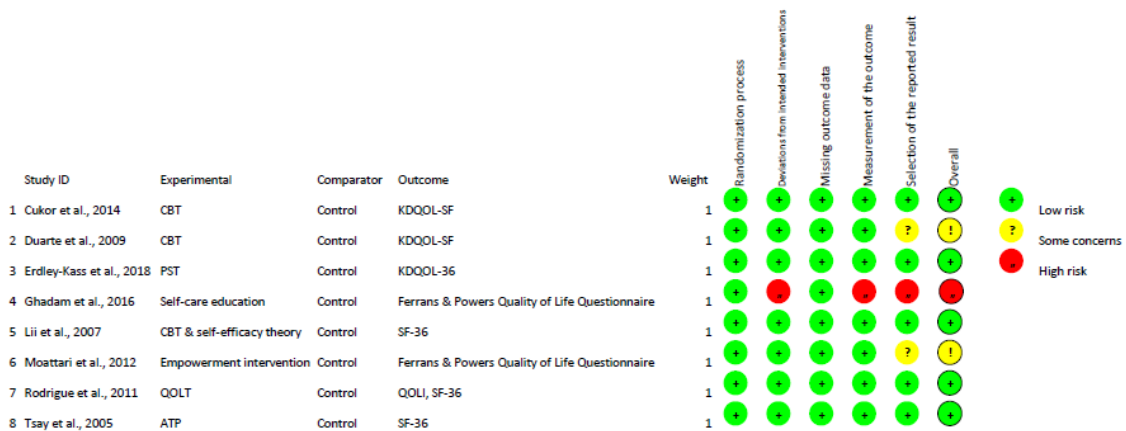
Appendix 2. Risk of bias summary.

Appendix 3. Risk of bias graph.