

Depression, Anxiety, and Quality of Life among Hemodialysis Patients with Chronic Kidney Disease: A Systematic Review

Akriti Kafle Baral¹, Suraj Baral², Sapna Burlakoti³, Anil Kafle⁴

¹Mansarovar Global University, India

²Charak Memorial Hospital Pvt. Ltd., Nepal

³Universal College of Medical Science, Nepal

⁴National Path Lab, Nepal

Corresponding Author, Akriti Kafle Baral, akriti.kafle@yahoo.com

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ABSTRACT

Chronic kidney disease (CKD) is a major global health concern, with hemodialysis serving as the primary treatment for patients with end-stage renal disease (ESRD). Although life-sustaining, hemodialysis often imposes substantial psychological and physical burdens that adversely affect patients' quality of life (QoL). This systematic review examined the association between depression, anxiety, and QoL among hemodialysis patients with CKD. A comprehensive literature search was conducted in PubMed, Google Scholar, ProQuest, SciELO, LILACS, and Embase for studies published between January 2018 and July 20, 2023. Of the 3,025 records identified, 20 studies involving 5,209 hemodialysis patients met the inclusion criteria. The prevalence of depression ranged from 5.52% to 76%, indicating considerable variability across study populations but highlighting depression as a common psychological problem. Most studies consistently reported a significant negative association between depression and QoL, with reported p-values ranging from <0.001 to 0.1, demonstrating that greater depressive symptoms were associated with poorer overall well-being. The findings emphasize the need for routine psychological assessment and timely interventions to improve mental health and QoL in this population. Further large-scale, multicenter studies are required to clarify these relationships and support the development of effective, evidence-based strategies for improving patient outcomes and informing clinical practice and health policy.

KEYWORDS

End-stage renal disease, Chronic kidney disease, Depression, Quality of life, Hemodialysis patients

INTRODUCTION

Background of CKD

Depression research and its impact on quality of life with chronic kidney disease (CKD) is an important and complex topic. Many studies have repeatedly demonstrated a higher prevalence of depression among people with CKD than in the general population, which is due to the multi-factorial problems that arise with chronic disease. A depressed mood in a person with CKD can have a significant impact on the many aspects of their health, including diminished physical ability, difficulty staying focused; feeling tired, and sleep problems. Importantly, this emotional burden can add to the complexities of coping with a chronic medical issue such as CKD. Depression and CKD are linked and interdependent, meaning that depression can affect the progression of CKD and vice versa. Depression in CKD patients adversely impacts adherence to treatment strategies and negatively affects quality of life. In the broader context of managing depression in the CKD, holistic care practices that include mental health evaluations, mental health treatment and strategies to improve overall wellbeing become imperative. Healthcare practitioners can aim to enhance patient outcomes and overall quality

of life for patients facing the challenges of CKD by taking into account both physical and psychological factors.

Silva et al. (2020) suggested that the global prevalence of CKD is rapidly increasing due to aging populations and the rise of chronic conditions. Prevention becomes crucial in public health policies to address this issue. The growing challenge highlights the need for updated management models for chronic conditions in modern times. Gonzales-Leon et al. (2019) concluded CKD patients experience reduced QoL, improved by monitored PA that enhances physical and psychological well-being. The patient's living situation and support from relatives also impact their psychological aspect. Thakar et al. (2023) analysis in 2022, estimated 37 million Americans were affected by kidney disease. Among those with diabetes, nearly a third had kidney disease, while 1 in 5 people with high blood pressure also had it. Around 786,000 people in the US lived with end-stage renal disease (ESKD), with 71% on dialysis and 29% having received a kidney transplant. In 2021, 24,669 kidney transplants were performed, while 90,201 people were waiting for a kidney transplant.

Gerogianni et al. (2018) show that treatment methods for reducing anxiety and depression in hemodialysis patients include pharmacological therapy, cognitive-behavioural therapy, exercise, and relaxation techniques like Benson's method and acupressure. Educating patients and conducting systematic psychiatric evaluations can enable early diagnosis and treatment of depressive symptoms. Cantillo-Medina et al. (2021) found that the spiritual dimension was least affected, followed by psychological and physical. Aspects like independence, intact mental function, education level, family support, and active working life positively influenced coping, satisfaction, and quality of life for transplant recipients.

Schmidt (2019) reported depression is prevalent in CKD patients (20-30% in HDP) but is often underdiagnosed due to overlapping symptoms with CKD-related complaints. Han et al. (2022) explored the mediating role of depression on social support and attitudes towards death and found direct effect of social support on depression was the strongest. By 2040, it's predicted that 642 million people will have CKD.

Dunbar et al. (2023) examined the effects of exercise on physiologic and psychologic outcomes in patients with ESKD undergoing hemodialysis in Lebanon. Worldwide, over 2 million people receive dialysis, with a 5-year survival rate of 63.3%. Hemodialysis can lead to muscle atrophy and decreased QoL, resulting in lower health-related QoL indices compared to the general population. Amaral et al. (2019) also show an increasing prevalence of CKD in the U.S. from 13.2% in 2010 to 14.4% in 2020 and 16.7% in 2030. CKD prevalence varies with age globally, ranging from 25.1% in Nicaragua (age 60-70) to 30.8% in Canada (≥ 65 years).

Review related to depression and QoL

Huang et al. (2021) estimated a pooled prevalence of 19% for anxiety disorders and 43% for elevated anxiety symptoms among CKD patients. Risk factors for elevated anxiety symptoms included depression, comorbidities, longer hospitalization, reduced QoL, and decreased vitality (Huang et al., 2021). Ghiasi et al. (2018) found mean QoL scores: SF 36 - 60.31% (95% CI: 69.00%-51.62%), HRQOL - 51.60% (95% CI: 53.45%-49.75%), and KDQOL SF - 50.37% (95% CI: 54.77%-45.96%). Ferreira et al. (2021) conduct a systematic review that analyzed exercise interventions' effects on depression and anxiety in CKD patients and found exercise had a significant difference in depression compared to active control (SMD=-0.66, [95% CI: -1.00 to -0.33]). Gerogianni et al. (2018) conduct a review of research and highlights that depression in HDP can result in sexual dysfunction and non-adherence, while unemployment may lead to depressive disorders due to feeling like a financial burden. Gregg et al. (2020) conducted a systematic review and suggested depressive disorder prevalence was up to 25% in CKD and ESKD patients, compared to 7% in the general population.

De Almeida et al. (2022) conducted review research and found depression, anxiety, and reduced QoL in end-stage CKD patients, with a global prevalence of 10-13% in developed countries. Taylor et al. (2022) conducted review research and suggest non-pharmacological interventions demonstrated positive psychological and physiological effects in people with long-term conditions, indicating their potential as complementary treatments to current maintenance approaches. Cremasco et al. (2018) conducted review research and the result suggest depressive symptoms' prevalence ranged from 7.8% to 83.49%. Caetano et al. (2022) shows QoL scores lower satisfaction with health (2.98 ± 0.83) and environment (2.75 ± 0.38), but better psychological (3.80 ± 0.53) and social relationships (3.58 ± 0.58). Pugi et al., shows HRQoL was significantly affected in the physical, psychological, and social dimensions and also related health perception and psychological QoL (Kemnitz et al., 2023). Shirazian (2019) shows depression is prevalent but often unrecognized in CKD patients, particularly among racial/ethnic minorities. The prevalence of depressive symptoms in predialysis CKD is around 20% to 25%. Runner et al. (2021) show depression prevalence in CKD is 21.4% to 27.4%, significantly higher than the general population.

Study aims

The aim of this review is to investigate the impact of depression, on the QoL in HDP with CKD. The study seeks to examine how the presence of depression symptoms affects various aspects of the patients' well-being, including physical, psychological, and social dimensions. The relationship between Depression and QoL in this particular population will allow healthcare providers to more readily recognize and attend to the needs of patients on hemodialysis. Such knowledge is important for designing interventions and support strategies which can help to promote the overall health and improve the QoL for those undergoing hemodialysis treatment for CKD. The results of this review might have relevant consequences for patients' management and could be useful in developing more comprehensive and effective management plans for this vulnerable population.

Relevancy of Research

The significance of this study is that it could contribute to the research that would help to tackle the psychological aspect of the well-being of patients undergoing hemodialysis treatment along with their overall quality of life. This research aims to illuminate the critical relationship between depression and the experienced QoL of HDP by a systematic review of previous studies. This study highlights the importance of addressing depression as an issue that affects patients' QoL, thus emphasizing the need for an integrated approach that takes into account the psychological and emotional needs of patients undergoing hemodialysis, not just the physical ones. Moreover, the systematic review help improve the understanding of the relationship between depression and the general QoL of HDP. This holistic perspective can help design interventions, support systems, and care plans that tackle the various aspects of these patients' problems and enhance their mental health and overall QoL throughout the hemodialysis treatment.

Novelty of research

The systematic review on depression and quality of life in hemodialysis patients brings some new aspects to the nursing practice area. Firstly, it brings together all the relevant literature published since January 2018 until July 2023, giving a current synthesis of knowledge in the field of Hemodialysis patients (HDP) and Chronic Kidney Disease (CKD). This temporal specificity increases the pertinence and usefulness of the results. Furthermore, the review is not only about depression but also provides an in-depth analysis of anxiety and mental health (MH) issues as a part of a comprehensive examination of the psychosocial challenges HDP are

experiencing. Furthermore, the statistical analysis of depression scores and depression's correlation with quality of life (QoL) also give the study a quantitative element, bolstering the body of evidence for the nursing profession.

Implications for Nursing Practice

The implications for nursing practice are presented here. The systematic review has applicability for nursing practice. The high prevalence of depression found (between 5.52% and 76%), highlights the need to be more alert and to implement more effective screening for mental health problems in HDP. The strong and enduring link between depression and decreased health-related quality of life is a reminder of the importance of nursing professionals in delivering targeted interventions to treat mental health issues in these patients. The significance of anxiety as a relevant issue that can affect QoL highlights the importance of a comprehensive strategy to mental health in nursing care plans. This study's attention to the gender of the participants and the average age of the participants informs the nursing profession to tailor interventions to specific demographic groups, as they can be faced with unique challenges.

In addition, the novel knowledge about the diversity of research methodologies—with more cross-sectional designs—is valuable information for nursing researchers to have in the domain. A statistical examination of the p-values and depression scores will give a numerical basis, which will help with evidence-based decisions for nursing practice. The strengths and weaknesses of the literature that has already been studied and published can enable nursing professionals to identify gaps in knowledge and help inform future research. Overall, the review helps enable nursing practitioners to incorporate mental health into the care of HDP, thereby ensuring a holistic and patient-centred approach to HDP care, which will ultimately help enhance their overall well-being and quality of life.

Conceptual Framework

The review is based upon a conceptual framework that views depression as the primary factor that affects quality of life among hemodialysis patients with chronic kidney disease. Depressive symptoms may be caused by disease burden, comorbidity, and psychosocial factors including anxiety, social support and socioeconomic status. A higher level of depression is likely to have a detrimental impact on four different aspects of quality of life: physical, psychological, social and functional.

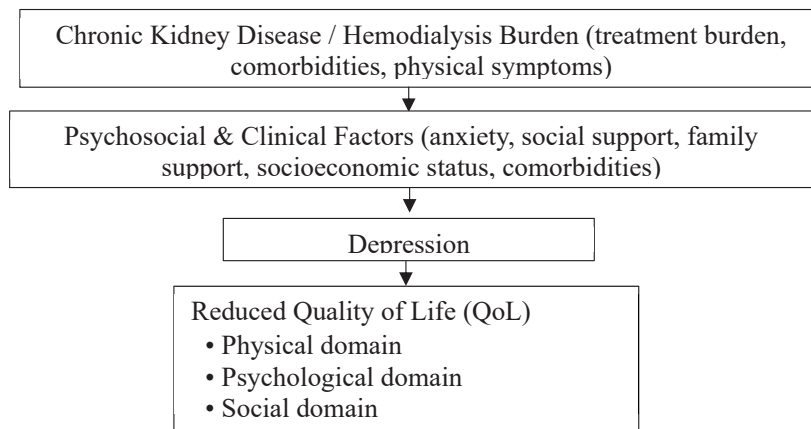


Figure 1: Conceptual framework showing the relationship between CKD/hemodialysis burden, depression, and quality of life

MATERIALS AND METHODS**Search Protocol**

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009; Page et al., 2021) were followed in the conducting of this systematic review. A methodological limitation of the review is not having registered the review protocol in the International Prospective Register of Systematic Reviews (PROSPERO) prospectively. The eligibility criteria, search strategy and synthesis methods, however, were predetermined in order to remain transparent and methodologically sound.

Search Strategy and Information Sources

This research is systematic literature review based on PRISMA protocol. The sources of the articles were six electronic databases (PubMed, Google Scholar, ProQuest, SciELO, LILACS and Embase) that were selected using pre-established criteria for the inclusion of articles, which emphasized quality of life among patients with chronic kidney disease. The time period of the search was between 2018 and 2023, and the keywords were “quality of life” and “Depression”. A total of 20 articles were found after thorough evaluation using the aforementioned databases (Google Scholar: 97, ProQuest: 23, PubMed: 14, SciELO: 17, LILACS: 15, Embase: 10). Narrative synthesis approach was used as a method to analyze the data. The results of the studies included were systematically synthesized, compared and contrasted to determine commonalities, differences and general trends in depression and quality of life in hemodialysis patients with chronic kidney disease. The diverse nature of the study designs, level of detail in outcome measures and reporting of the studies precluded the possibility of quantitative pooling.

Screening and Eligibility Criteria

The studies included in this review included those that matched the following criteria: studies that addressed depression and quality of life of people with CKD, including those who were on hemodialysis. Furthermore, the studies had to be in English and published from January 2018 to July 2022. Studies that included family members, caregivers or health care professionals of kidney disease patients or measures of outcomes related to these subjects were excluded from the review. It also omitted use of research protocols, reviews, conference papers and abstracts.

Data Extraction and Synthesis

The reviewer gathered relevant information from all the studies such as publication year, publication title, author, study design, aim of the study, samples' characteristics (number of subjects, mean age, sex), psychological parameters measured in the study (depression, quality of life, etc.), outcome measures, results of the study, and conclusion.

Narrative Synthesis and Rationale for Not Conducting Meta-analysis

The findings from the studies included were summarized and compared using a narrative synthesis approach. Although quantitative meta-analysis was considered, it was not conducted because there was significant variation in the study design, patient characteristics, assessment instruments used for depression, and the methods used to report outcomes analyzed across the included studies. The studies used a variety of designs such as cross sectional, pre-post, semi-experimental, prospective, and longitudinal designs, with depression results presented as prevalence rates, mean scores, median scores, and p-value.

Due to these methodological and clinical differences, the computation of a pooled prevalence estimate or a pooled effect size might have led to misleading results. Accordingly, the synthesis method (narrative) was used to identify patterns and understand the relationship between depression and the quality of life of the hemodialysis patients.

Heterogeneity Assessment

When performing a meta-analysis, the I^2 statistic is generally used to evaluate statistical heterogeneity among studies. However, since this was not a quantitative meta-analysis, formal calculation of I^2 was not possible. The included studies showed high levels of methodological, clinical, and statistical heterogeneity, with respect to study design, patient populations, assessment tools used for depression, and the format used to report outcomes. These differences ruled out meaningful statistical pooling and formal heterogeneity estimation by using the I^2 .

Effect Size Reporting

Additionally, to the p-values, reported effect size measures (such as correlation coefficients [r] odds ratios [OR], beta coefficients [β], standardized mean differences [SMD] and mean differences [MD]) provided by the original studies were used to assess the strength and direction of the association between depression and quality of life. Many of those studies included, however, only provided a prevalence estimate or depression scores or only provided p-values, thus preventing quantitative comparison across studies.

Methodological Quality Assessment

Joanna Briggs Institute (JBI) critical appraisal instruments were used to evaluate the methodological quality and risk of bias in a formal methodological quality assessment. The included studies used a variety of designs, so design-specific JBI checklists were applied.

The JBI Analytical Cross-Sectional Checklist was used for the assessment of cross-sectional and observational studies. Quasi-experimental studies were evaluated using the JBI Quasi-experimental Checklist, and cohort/prospective studies were evaluated using the JBI Cohort Checklist, as done in Hernandez et al. (2018) and Moodi et al. (2020) respectively, and Khan et al. (2019) and Kurita et al. (2020) respectively.

All studies were judged by two independent reviewers for inclusion, description of participants, validity of measurements, confounding factors, and the type of statistics used. The items were scored as “Yes,” “No,” “Unclear,” or “Not Applicable” and disagreement was addressed by consensus.

To provide comparability, quality scores were converted into an 8-point scale (7 to 8 being high quality, 5 to 6 being moderate quality, and below 5 being low quality). The 20 studies included were rated as high quality (13) or moderate quality (7) but were not rated as low quality. Main limitations include poor bias management reporting and poor confounding control.

Table 1: Methodological Quality Assessment of Included Studies Using JBI Checklist

Records Screened (n=233)				
S.N.	Study	Design	JBI Score	Quality
1	Hernandez et al., 2018	Single-arm pre-post trial	08-Jun	Moderate
2	Senanayake et al., 2020	Cross-sectional	08-Aug	High
3	Adejumo et al., 2019	Cross-sectional	08-Jul	High
4	Jeon et al., 2019	Cross-sectional	08-Jul	High
5	Pretto et al., 2020	Cross-sectional	08-Jun	Moderate
6	Loureiro et al., 2018	Cross-sectional	08-Jul	High
7	Mosleh et al., 2020	Cross-sectional	08-Jul	High
8	Senanayake et al., 2019	Cross-sectional	08-Aug	High
9	Schricker et al., 2019	Survey / Observational	08-Jun	Moderate
10	De Brito et al., 2019	Cross-sectional	08-Jul	High
11	Teles et al., 2018	Cross-sectional	08-Jul	High
12	Ahlawat et al., 2018	Cross-sectional	08-Jun	Moderate
13	Alosaimi et al., 2020	Cross-sectional	08-Jul	High
14	Moodi et al., 2020	Semi-experimental	08-Jun	Moderate
15	Jankowska-Polańska et al., 2019	Cross-sectional	08-Aug	High
16	Shdaifat et al., 2022	Cross-sectional	08-Jul	High
17	Khan et al., 2019	Multicenter prospective	08-Aug	High
18	Bawazier et al., 2018	Cross-sectional	08-Jun	Moderate
19	Alshraifeen et al., 2020	Cross-sectional	08-Jul	High
20	Kurita et al., 2020	Cross-sectional+ Longitudinal	08-Aug	High

MCS scale ranges

The Physical Component Score (PCS) and the Mental Component Score (MCS), both ranging from 0 to 100, with higher scores indicating better physical and mental health functioning. A PCS score of 50 or below suggested compromised physical health, while an MCS score of 42 or below may indicate the presence of clinical depression (Ware et al., 1995). Linear mixed models (LMM) were employed to analyze how the mean component scores changed over time and whether they varied based on eventual dementia status (Ding et al., 2021). The PCS and MCS both had a mean of 50 and a standard deviation of 10, with higher scores indicating better overall health.

RESULTS**Study Selection**

Systematic reviews using the PRISMA protocol are shown in Figure 2 and Factors that affect the quality of life in patients with chronic kidney disease are age, comorbidities, socioeconomic status, income, coping, anxiety and depression, family support, and drug use. Positive self-acceptance, self-efficacy, and increased self-management skills can enhance the disease adaptation process, positively impacting patients' quality of life with chronic kidney disease. Our search retrieved 3025 articles in total. After removing 2792 duplicates, 172 relevant articles were screened based on title and abstract. Of those 172 articles, 152 were

JOURNAL OF ADVANCED ACADEMIC RESEARCH (JAAR)

excluded, and 37 potentially relevant articles were screened in full text. Finally, 20 articles were eligible for inclusion in this review.

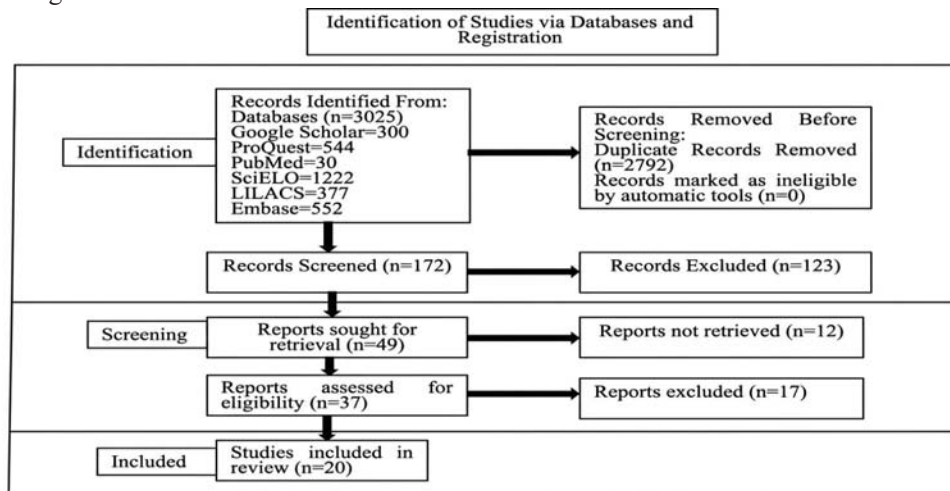


Figure 2: Preferred Reporting Items for Systematic Review flow chart of the systematic review

Sample Characteristics

Participants from all the studies were diagnosed with CKD, and most were undergoing hemodialysis treatment. The sample size at baseline ranged from 14 to 5209 individuals, with a total of 5209 participants across the studies. In 20 papers, authors provided information about the sex of the participants, and from a total of 5209 people, 2894 were male and 2315 females. Regarding age, no specific overall mean age was reported of participants, the mean age of participants was ranges from 11.1 year to approx. 70 years (see Table 2). In addition, table 2 give the detail the impact of depression, anxiety, mental health and their impact on QoL on HDP.

Table 2: Sociodemographic Characteristics of Participants by Study (Number of participants, sex, mean age, CKD and HD)

Study	No. of Participant	Men (%)	Women (%)	Average (age) $\pm$ SD	Status
Hernandez et al., 2018	14	7 (50)	7(50%)	57.43	CKD HD
Senanayake et al., 2020	1174	681	398	58.3 $\pm$ 10.7	CKD HD
Adejumo et al., 2019	57	24(42.1)	33(57.9)	<40 and $\geq$ 40	CKD HD
Jeon et al., 2019	71	62(87.3)	9(12.7)	49.30 $\pm$ 10.58	CKD HD
Pretto et al 2020	183	116(63.4)	67(36.6)	62.61	CKD HD
Loureiro et al., 2018	264	156 (59.1)	108 (40.9)	51.26 $\pm$ 14.05	CKD HD
Mosleh et al., 2020	122	53(43.4)	69(56.6)	51.5	CKD HD
Senanayake et al., 2019	1036	646(62.4%)	390(38.6)	41-60	CKD HD
Schricker et al., 2019	54	-	19	28-84	CKD HD
De Brito et al., 2019	205	108(52.7)	97(47.3)	54.5 $\pm$ 12.7	CKD HD
Teles et al., 2018	200	121(60.5)	-	46.6 $\pm$ 15.4	CKD HD
Ahlawat et al., 2018	612	324	288	$\leq$ 60 and $>$ 60	CKD HD
Alosaimi et al., 2020	101	56 (55.4)	45(44.6)	54.0 $\pm$ 12.3	CKD HD
Moodi et al., 2020	70	EG: 18 (54.5) CG: 17 (48.6)	EG: 15 (45.5) CG: 18 (51.4)	$\leq$ 50 to $>$ 60	CKD HD
Jankowska-Polańska et al., 2019	105	45 (43.69)	58 (56.31)	64.92 $\pm$ 12.56	CKD HD
Shdaifat et al., 2022	105	80(76.2)	25(23.8)	49.5 $\pm$ 16.5	CKD HD
Khan et al., 2019	220	122 (55.5)	98 (45.5)	56.58 $\pm$ 11.09	CKD HD
Bawazier et al., 2018	100	30(30)	70(70)	<40 and $>$ 60	CKD HD
Alshraifeen et al., 2020	202	-	74 (36.6)	47.75 $\pm$ 15.11	CKD HD
Kurita et al., 2020	314	228(73)	86(37)	67.6 $\pm$ 14.1	CKD HD

EG=Experimental group.

Prior to presenting Table 3, it is important to note that depression outcomes were reported in various ways across the studies included. A few studies reported prevalence rates as percentages of depression, and a few others reported continuous depression scores based on validated scales, including BDI, HADS, and ADS-L. A few studies reported median values instead of means. To enhance the clarity and comparability of depression outcomes, prevalence measures were separated from continuous score measures.

Table 3: Level of Depression and Quality of Life among Hemodialysis patient CKD

S. N	Authors	Objective	Method	DP(SD)	QoL	SR (p)
1	Hernandez et al., 2018	Psychological Intervention	Single-arm pre-post-trial	15.48(5.52)	Y	p=0.04
2	Senanayake et al., 2020	HRQoL and Associated Factors	Cross-Sectional	MD: 37.9	Y	p<0.001
3	Adejumo et al., 2019	Psychosocial well-being and QoL	Standardized Instruments	31.6% vs 5.3%	Y	p=0.004
4	Jeon et al., 2019	Factors affecting DP symptoms	Cross-Sectional	17.61 (10.64)	Y	p= .013
5	Loureiro et al., 2018	MH problems in patients	Cross-Sectional	14.0%	Y	p<0.01
6	Mosleh et al., 2020	Prevalence and factors associated with AN and DP	Cross Sectional	24.6%	Y	P = 0.003
7	Senanayake et al., 2019	QOL and utilization among patients with CKD	Cross-Sectional	64.2%	Y	P<0.001
8	Schricker et al., 2019	Pruritus, impaired MH and inflammation contribute to morbidity in ESRD	Survey	ADSL: RRT:10.50 (6.7519.20)	Y	p= 0.0117
9	Pretto et al., 2020	sociodemographic and clinical variables, life habits and functional capacity with symptoms indicative of depression in chronic renal patients on hemodialysis	cross-sectional	60.3%	Y	p<0.001
10	De Brito et al., 2019	Prevalence of DP and AN among RRT patients	Cross-sectional	41.7%	Y	p<0.001
11	Teles et al., 2018	Factors associated with QoL and DP on HDP	SF-36 and BDI	29%	Y	P<0.0001
12	Ahlawat et al., 2018	Prevalence of DP in patients with CKD and the factors affecting	Cross-sectional	28.4%	Y	P=0.026
13	Alosaimi et al., 2020	Psychosocial disorders with QoL among HDP	Cross-sectional	24.8%	Y	P=0.011
14	Moodi et al., 2020	Effectiveness of spiritual therapy on DP, AN, and stress in HDP	Semi-experimental study	BI=24.24+-4.77, IAI=22.43+-4.33, TMAI=22.36+-3.46	Y	p<0.001
15	Jankowska-Polańska et al., 2019	Relationship between illness acceptance, AN and DP, and HRQoL in HDP	AIS, HADS and SF-36	7.91(4.37%)	Y	p<0.001
16	Shdaifat et al., 2022	Association between demographic and negative emotional states of DP, AN and stress	Cross-sectional	60 (57.1)	Y	p<0.086
17	Khan et al., 2019	Prevalence and predictors of depression among HDP	Multicenter prospective	78.13%	Y	P=0.039
18	Bawazier et al., 2018	Determine the proportion of caregivers who suffer from AN and DP	Cross-sectional	28%	Y	p=0.015
19	Alshraifeen et al., 2020	Levels of spirituality, DP and AN among HDP	Cross-Sectional	70.55%	Y	p<0.01
20	Kurita et al., 2020	Associations between sarcopenia with both DP and hopelessness	Cross-sectional and Longitudinal analyses	64(41%)	Y	0.049

JOURNAL OF ADVANCED ACADEMIC RESEARCH (JAAR)

SR=Statistical Relation, MD=Median; ADS-L=Allgemeine Depressionsskala - Langform" depression score; BI= Before the Intervention; IAI=Immediately After the Intervention=IAI; TMAI= Three Months After the Intervention; SF36-msc=Mental Health Subscale of the 36-item Short-Form Health Survey; AIS=Acceptance of Illness Scale; HADS= Hospital Anxiety and Depression Scale; BDI= Beck Depression Inventory and Y=Yes

Various methods of measuring depression had different reported outcomes across studies. The prevalence rate reported in studies ranged from 5.52% to 76% of patients undergoing hemodialysis with depressive symptoms. Studies that used continuous psychometric scales, however, reported from a wide range of depression scores, with the average score varying based on the instrument used. This variation is due to differences in the measures of depression in the studies included.

Table 4: Classification of Included Studies by Methodological Design

Methodology	Studies	Number
Cross-sectional / Observational	Senanayake 2020, Adejumo 2019, Jeon 2019, Pretto 2020, Loureiro 2018, Mosleh 2020, Senanayake 2019, Schricker 2019, De Brito 2019, Teles 2018, Ahlawat 2018, Alosaimi 2020, Jankowska-Polańska 2019, Shdaifat 2022, Bawazier 2018, Alshraifeen 2020	16
Quasi-experimental / Pre-post	Hernandez 2018, Moodi 2020	2
Prospective / Longitudinal	Khan 2019, Kurita 2020	2

Results Grouped by Study Methodology

The majority of studies included employed a cross-sectional study or observational design. In all these studies, depression was consistently reported as a frequent problem for patients with CKD or undergoing HD and was found to be related to a decrease in quality of life. The prevalence of depression in cross-sectional studies ranged from moderate to high with the majority indicating a statistically significant relationship between depression and reduced QoL, such as the studies by Senanayake et al. (2020), Mosleh et al. (2020), De Brito et al. (2019), Teles et al. (2018), Alosaimi et al. (2020), and Alshraifeen et al. (2020).

The quasi-experimental and pre-post studies were intervention-based such as Hernandez et al., 2018 and Moodi et al., 2020. According to these studies, psychological or spiritual treatments could help to lower depressive symptoms of hemodialysis patients and to enhance mental health.

Prospective and longitudinal studies such as Khan et al. (2019) and Kurita et al. (2020) offered more temporal evidence of depression and patient outcomes. These studies suggested that depressive symptoms were related to poor clinical and functional outcomes such as lower health status and quality of life.

Of the 20 studies, 13 were of high methodological quality and 7 were moderate methodological quality. Well-designed studies tended to have more details about the participants, items used to measure the participants, and appropriate statistical analysis; limited studies were mostly related to inappropriate reporting of confounding control and bias.

Methodological Quality of Included Studies

All included studies were of moderate to high methodological quality as assessed through quality appraisal with Joanna Briggs Institute (JBI) critical appraisal tools. Of the 20 studies included, there were 13 high and 7 moderate quality studies, none of low quality were

identified. The most frequent methodological shortcomings were: not enough control over confounding factors and not enough reporting on bias management.

DISCUSSION

Depression its impact on quality of life

In all of the studies included, depression has been consistently found to be negatively associated with the patients' quality of life in hemodialysis. Most of the available studies reported the statistical significance primarily in terms of p-values, but the reported evidence indicated that the strength of the association was moderate to high. Higher prevalence rates of depression were typically associated with poorer outcomes regarding physical, psychological, and social quality of life, suggesting that the findings went beyond the statistical significance level.

Hernandez et al. (2018) conducted a study focused on evaluating the feasibility of an Internet-based positive psychological intervention for HDP experiencing symptoms of depression. Their research aimed to investigate the prevalence of depression among this specific patient population and examine its impact on the quality of life. The study revealed that a notable 5.52% of HDP were found to be experiencing depression, which has been shown to have a significant negative effect on their QoL. Moreover, the researchers discovered a statistically significant p-value of 0.04, suggesting a strong association between depression and its detrimental effects on the patient's well-being. The findings of this study highlights the importance of addressing depression in HDP and highlight the potential benefits of implementing Internet-based positive psychological interventions to improve their MH and overall quality of life. Further research in the area could provide valuable insights into comprehensively addressing the well-being of this patient population (Hernandez et al., 2018).

Senanayake et al. (2020) conducted a study on HRQoL in a rural community in Sri Lanka that was impacted by CKD. They were particularly interested in the HDP and had some interesting observations to make. The study found that depression scores was a median of 37.9%, and MCS was 39.6% for these patients. They also examined the effects of depression and MCS on the QoL of HDP. Their results pointed out that both depression and the MCS contributed significantly to the QoL, with a p value of < 0.001 , which demonstrates a strong relationship between the two, and the overall health of the patient. The study emphasizes the importance of addressing depression and mental health concerns of HDP to enhance their lives in the rural communities of Sri Lanka where CKD is prevalent (Senanayake et al., 2020).

Adejumo et al. (2019) explored the burden, psychological health and QOL of caregivers of ESRD patients, particularly for HDP. The study revealed 31.6% of caregivers had depressive symptoms and an equal number had anxiety symptoms. Moreover, the researchers examined the impact of depression and anxiety on the caregivers' quality of life. The results demonstrated a noteworthy effect, with a significant p-value of 0.004 for depression and a p-value of less than 0.001 for anxiety. These findings indicate a strong association between the caregivers' psychological well-being and the quality of life they experience when caring for ESRD patients undergoing hemodialysis (Adejumo et al., 2019).

Jeon et al. (2019) investigated the factors influencing depressive symptoms in employed HDP with chronic renal failure. The research revealed that 17.61% of these employed HDP experienced depressive symptoms. The patients' MCS was recorded at 48.10. Furthermore, the study explored the impact of depression on the patient's QoL. The findings indicated a significant effect, with a p-value of 0.013, suggesting a strong association between depressive symptoms and the overall QoL in employed HDP with chronic renal failure. It is essential to note that the study did not examine MH and anxiety factors. (Jeon et al., 2019). Pretto et al. (2020) examined the prevalence of depression and associated factors in chronic renal patients undergoing hemodialysis. The research revealed that a significant proportion, specifically

60.7%, of chronic renal patients on hemodialysis experienced depression. The patients' MCS was measured at 48.10. Moreover, the study explored the impact of depression on the patient's QoL. The findings indicated that depression had a significant effect on the patients' overall QoL. However, it's important to note that the study did not investigate anxiety and MH aspects (Pretto et al., 2020).

Mosleh et al. (2020) investigated the prevalence and factors related to anxiety and depression in chronic kidney disease patients undergoing hemodialysis. The study found that 24.6% of patients were experiencing depression, and 19.7% reported symptoms of anxiety. Both depression and anxiety were found to significantly impact the patient's QoL. The study reported a significant p-value of 0.003 for depression and a p-value of 0.04 for anxiety, indicating a strong correlation between these MH conditions and the patient's overall well-being (Mosleh et al., 2020). Senanayake et al. (2019) evaluated the validity and internal consistency of the EQ-5D-3L quality of life tool among pre-dialysis patients with CKD in a lower-middle-income country. The research revealed that a significant percentage, specifically 64.2%, of pre-dialysis patients experienced depression. Both depression and the MCS were found to significantly influence the patients' QoL, with a p-value of less than 0.001 for MCS (Senanayake et al., 2019).

Schricker et al. (2019) examined strong associations between inflammation, pruritus, and MH in HDP. The research revealed that the prevalence of depression in patients on RRT ranged from 6.75% to 19.20%, and in RRT-CKD-ap patients, it ranged from 10.0% to 29.0%. Additionally, the MCS score was reported as 51.00 for RRT patients and 42.06 for RRT-CKD-ap patients. Both depression and the MCS were found to significantly impact the patient's QoL. The study reported a significant p-value of 0.0117 for depression and a p-value of less than 0.0001 for the MCS. However, it's important to note that the study did not investigate anxiety and MH aspects (Schricker et al., 2019). De Brito et al. (2019) conducted a cross-sectional study to investigate the prevalence of depression and anxiety among patients undergoing dialysis and kidney transplantation. The study revealed that 41.7% of the patient's undergoing dialysis were experiencing depression, while 32.3% reported feelings of anxiety. The average MH score was 70.7 ± 19.7 , and the average MCS score was 50.1 ± 11.1 . The reported p-value was less than 0.001, indicating a significant association between depression, anxiety, MH, MCS, and the patient's QoL. Additionally, MH and MCS were found to have a significant impact on the patients' quality of life in this population (De Brito et al., 2019).

Teles et al. (2018) investigated the QoL and depression among HDP. They assessed the prevalence of depression and the MH score and its association with the patients' QoL. The study found that 29% of the HDP were experiencing depression. The average MH was reported to be 73.5 ± 24.5 , and the p-value was found to be less than 0.0001, indicating a significant association between depression, and the patients' QoL (Teles et al., 2018). Ahlawat et al. (2018) conducted a cross-sectional study to determine the prevalence of depression and its associated factors among patients with CKD in a public tertiary care hospital in India. The study found that 28.4% of the patients were experiencing depression. The reported p-value was 0.026, indicating a significant association between depression and the patients' condition (Ahlawat et al., 2018).

Alosaimi et al. (2020) investigated depression and anxiety among hemodialysis patients using validated assessment scales. The study found that 24.8% of the participants were experiencing depression, and 15.8% reported feelings of anxiety. The study analyzed the p-values for the association between depression and anxiety with the reported values ranging from 0.011 to 0.207 for depression and less than 0.001 to 0.007 for anxiety. These p-values indicate a significant association between anxiety and participants' perspectives on the disease (Alosaimi et al., 2020).

Moodi et al. (2020) investigated the effectiveness of spiritual therapy on depression, anxiety, and stress in HDP. They used a depression and anxiety and categorized depression into different categories: BI, IAI, and TMAI. They also assessed anxiety in different categories. The study found the following scores for depression categories: BI score was 24.25 ± 4.77 , IAI score was 22.43 ± 4.33 , and TMAI score was 22.36 ± 3.46 . Additionally, for anxiety categories, the scores were as follows: BI score was 20.21 ± 5.32 , IAI score was 19.20 ± 4.29 , and TMAI score was 19.79 ± 3.43 . The reported p-values were less than 0.001 for DP and less than 0.002 for AN, indicating significant associations (Moodi et al., 2020). Jankowska-Polanska et al. (2019) investigated the influence of selected psychological variables on the QoL of chronically dialyzed patients. They used a Health-Related Depression Scale and found that 4.37% of the patients were experiencing depression, and 3.23% reported feelings of anxiety. The study also measured MH and MCS, which were reported as 64.19 ± 14.03 and 55.59 ± 15.47 , respectively. The reported p-values for all these variables were less than 0.001, indicating a significant association between depression, anxiety, MH, MCS, and the patients' QoL (Jankowska-Polańska et al., 2019).

Shdaifat et al. (2022) investigated the QoL, depression, and anxiety in patients undergoing RRT in Saudi Arabia, using a depression and anxiety scale. The study found that 57.1% of the patients were experiencing depression, and 60.0% reported feelings of anxiety. The MCS score was measured as 48.0 ± 9.0 , and the reported p-value for MCS was less than 0.086, indicating a potential but not statistically significant association between MCS score and patients' quality of life (less than 0.05) (Shdaifat et al., 2022). Bawazier et al. (2018) investigated anxiety and depression among caregivers of HDP at the Indonesian national referral hospital using a depression and anxiety scale (DHP). The study found that 28% of the caregivers were experiencing depression, and 18% reported feelings of anxiety. The reported p-value for depression was 0.015, and for anxiety, it was 0.037, indicating a significant association between both depression and anxiety with the caregivers' MH. However, the study did not explore other factors such as MH and MCS, which could also impact the caregivers' overall QoL (Bawazier et al., 2018).

Kurita et al. (2020) investigated the relationship between hopelessness, depression, and sarcopenia in patients with ACKD and those undergoing dialysis. They used a depression and anxiety scale. The study found that 41% of the participants were experiencing depression, and the reported p-value for this association was 0.049, indicating a significant link between depression and the patients' condition. Additionally, the study revealed that depression had an effect on the QoL of the participants (Kurita et al., 2020).

Loureiro et al. (2018) investigated the impact of spirituality and religiousness on suicide risk and MH among patients undergoing hemodialysis. The study found that 14% of the participants experienced depression, and 14.7% reported feelings of anxiety. Both depression and anxiety were found to have a negative effect on the quality of life of these patients. The results from the statistical analysis showed that there were significant p-values for two conditions: depression and anxiety. Thus p-values for depression were less than 0.01, representing a strong association and for anxiety less than 0.001, representing an even stronger association. It's important to note that the study did not investigate the influence of spirituality and religiousness on MH or the MCS (Loureiro et al., 2018).

Alshraifeen et al. (2020) conducted a cross-sectional study in Jordan to explore the relationships between spirituality, anxiety, and depression among people undergoing DHP. The study reported that a substantial proportion of hemodialysis patients, specifically 70.55%, experienced depression, and 22.3% reported feelings of anxiety. The statistical analysis showed that both depression and anxiety were significantly associated with hemodialysis, with a p-value less than 0.01. In addition to depression and anxiety, the study found that depression and anxiety also affected the QoL of these patients. The study highlights the importance of

addressing depression, anxiety, and diabetic neuropathies to improve the well-being and quality of life of individuals undergoing hemodialysis treatment (Alshraifeen et al., 2020).

This study not only shows statistical significance, but also provides clinically relevant implications. Depression among hemodialysis patients is more than just a psychological co-morbidity; it is a clinically significant problem that is correlated with less adherence to dialysis, less physical functioning, fatigue, less social interaction, and less quality of life. Moderate depression symptoms can negatively impact dialysis adherence, nutrition, and health-care utilization. Thus, systematic screening and integrated psychosocial interventions are recommended to be seen as an integral part of comprehensive hemodialysis treatment.

One methodological problem with the study of depression in hemodialysis patients is the degree of overlap between somatization in chronic kidney disease and the items which are typically assessed on depression screening questionnaires. Fatigue, sleep disturbances, low appetite, low energy and impaired concentration may be due to either the physiologic burden from the CKD or to depressive symptomology. The overlap could lead to overestimation or misclassification of the prevalence of depression in some studies and needs to be taken into account in the interpretation of the findings of this review.

Descriptive Synthesis of Included Studies

Figure 3 presents the gender distribution of participants in the context of chronic kidney disease (CKD). One significant point to be noted from figure 2 is that there are 12% more male participants than females. The overall study population, which were combined from 20 articles, including review or research articles specifically targeting CKD, totals 5209. The methods used in these studies are discussed in greater detail in Figure 4, where a special focus is given to the predominance of cross-sectional approaches used in these studies. This analysis adds to the overall view of gender representation and research methodology used in the context of CKD research.

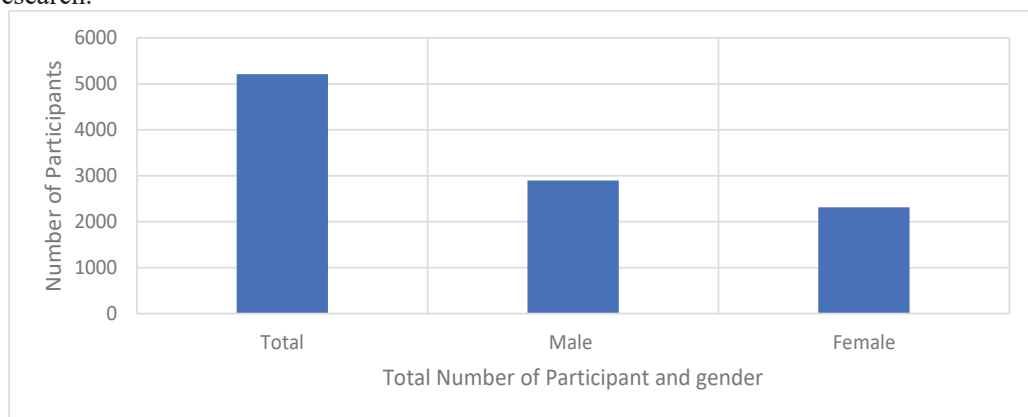
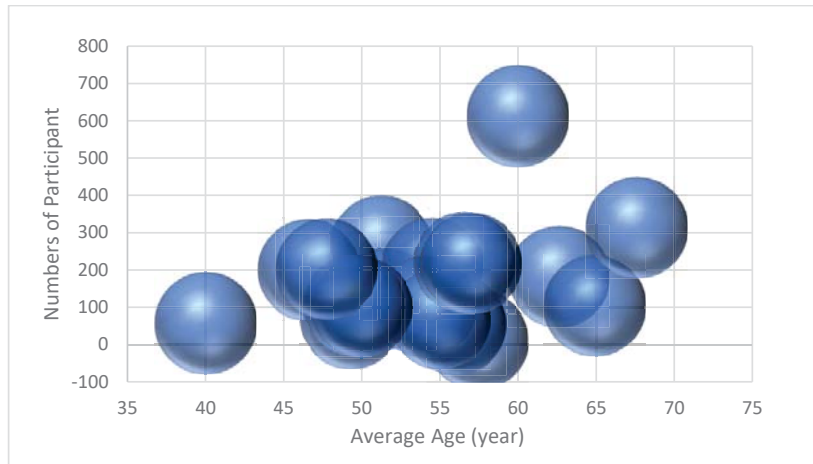
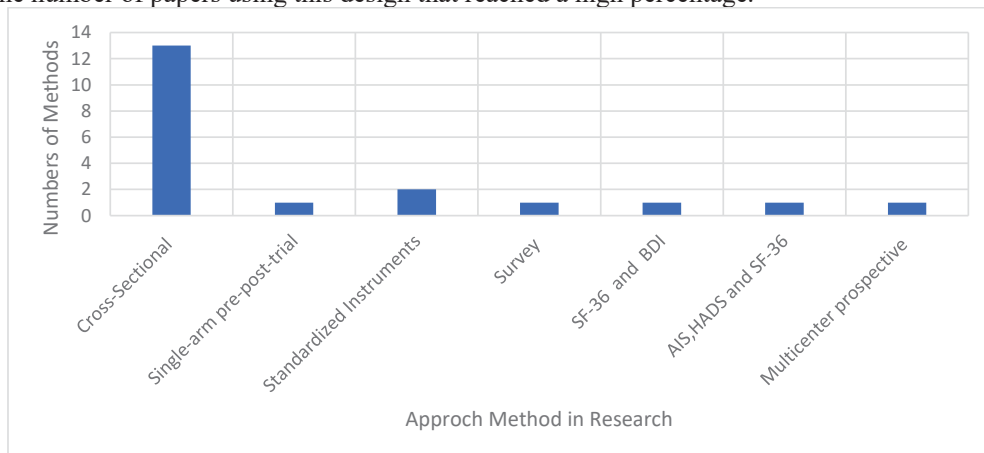


Figure 3: Participant Number with Gender

Figure 3 shows the average age of the participants in the review reports gathered, which is shown as a scatter graph. The analysis reveals that the average age of the participants is around 57 years, where the majority of the participants are aged between 45 and 60 years. The knowledge of the participants of the studies in the reviewed literature, especially the age distribution. Increasing age appears to be linked to an increased risk of CKD, and people aged 45 to 60 are at increased risk. By studying this age group, a population at greater risk for CKD can be targeted for examination of factors associated with the onset of the disease amongst a population that typically has the onset of the disease.

**Figure 4: Average Age of Participant**

Of the 20 papers that were included in the systematic review, the majority of papers used a cross-sectional research design in their studies, as shown in detail in Figure 4. Of the 20 research articles, 13 used the cross-sectional method, two used standardized instruments and the remaining studies used a variety of single methods. The prevalence and acceptance of the cross-sectional method as a well accepted and preferred research method in the nursing field is highlighted in this pattern. The majority of the chosen papers are using cross-sectional design, which is an effective and suitable design type in studying phenomena in nursing, as shown by the number of papers using this design that reached a high percentage.

**Figure 5: Approach Methods Counted in This Review**

The reported p values between 0.001 to 0.1 (more detail in figure 5) indicate that some association exists between the depression and the participants studied in the context of a systematic review designed to investigate the depression among the participants. The p values span a range of evidence against the null hypothesis, with lower values, such as $p < 0.001$ exhibiting greater statistical significance. Furthermore, the participants' consensus in recognizing the effect of depression on the quality of life highlights the relevance of the results. The common agreement reached by the participants is consistent with statistical data, and suggests that depression is a significant factor that impacts the quality of life for the population studied. The findings not only advance the field's knowledge on the link between depression and quality of life but also highlight the tangible consequences and the significance of mental

health issues in the context of overall health and well-being. The bar represents and error in p-value which is acceptable as it is the minimum error.

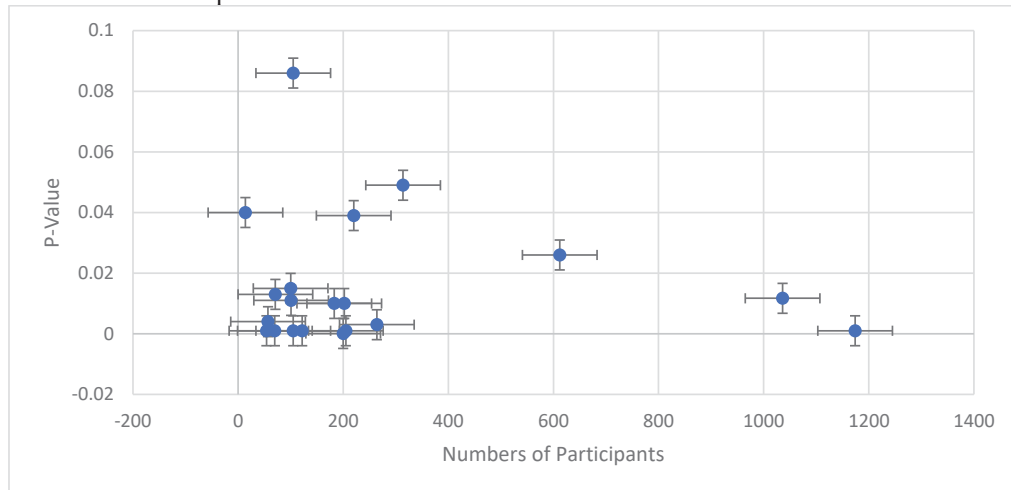


Figure 6: Numbers of Participant and P-Values

Upon the review of the depression scores (0–100%) across 0–100%, researchers found that they used different tools for assessment and also used different models to compute p-values and quantify the level of depression as can be seen in Figure 6. The results show that the depression levels varied according to the p-values in several studies. Each series in Figure 6 represents a different level of depression, while the trends of the p-values for each publication are shown in Series 2, and the average of the p-values for each publication over time are represented by the (...) lines. This indicates a dynamic relationship between depression severity and the statistical significance of study results across the range of studies reviewed, revealing the subtleties and variability in the measures and understanding of depression in the research arena.

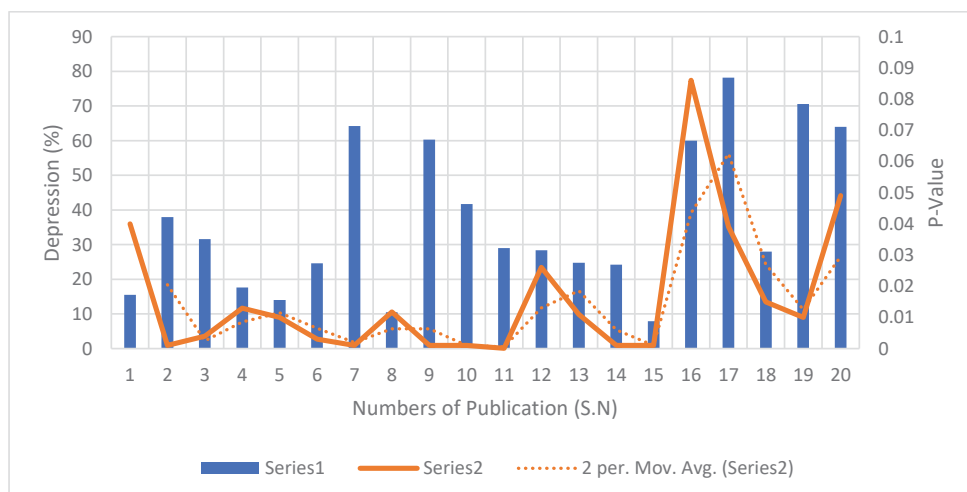


Figure 7: Numbers of Publications with Depression and P-Values.

Strengths and Limitations

Our study has several strengths: (1) PRISMA guidelines were followed; (2) in accordance with the PRISMA guidelines, a rigorous selection of the studies reviewed was carried out based on inclusion and exclusion criteria; (3) a complete search strategy was done in six mixed electronic databases: PubMed, Google Scholar, SciELO, ProQuest, LILACS and Embase; and (4) a comprehensive analysis of the 20 final articles on the intervention components, outcome measures and determinants from the studies were performed. Our methodology also has some limitations that must be considered: (1) by including only articles in the English language and papers published from January 2018 to July 2023 onwards, we may have left out relevant articles in other languages or earlier relevant literature.

Another limitation is the lack of prospective registration of the review protocol in PROSPERO, which might increase the reporting bias risk even though the review was conducted following PRISMA guidelines.

A further constraint was that there was significant heterogeneity between studies in the design, instruments used, and reporting of outcomes of the studies included in the meta-analysis. Thus, the results are presented as a synthesis of the narratives, not as a summary of quantitative estimates.

However, an I^2 statistic was not used to formally analyze heterogeneity because a quantitative meta-analysis was not possible. The studies included had significant methodological and population characteristics and outcome measures.

CONCLUSION

In conclusion, the reviewed studies shed light on the prevalence and impact of depression and MH conditions on the QoL of (HDP) with CKD. The findings consistently highlight the significant association between depression and MH with the overall QoL of HDP. A significant number of HDP reported depression (range 5.52% to 76%), and MH score ranged from one study to another but was generally correlated with well-being of the patients. Overall, the majority of studies clearly demonstrated the effect of depression and MH on QoL and found the p values to be significant, suggesting a strong correlation. The MCS was seen to be highly correlated with patients' QoL which indicates the significance of mental health in HDP. But some studies did not obtain a significant p-value which may be attributed to either smaller sample size or different study population. Less commonly explored, but also significantly associated with QoL in some studies was anxiety. Future studies in this field could yield a more complete picture of the role of anxiety in the health of HDP. Studies failed to examine the relationship between depression and anxiety with MH, thus offering a more thorough understanding of the mental health of patients. In addition, the sample sizes used in some of the studies were small, and results may not be generalizable. The evidence suggests that addressing depression and MH issues is crucial in improving the overall well-being and QoL of HDP with CKD. There is a need to implement interventions to target MH conditions, thereby improving the QoL of this patient population in healthcare care. More rigorous studies are required in order to fully understand the intricate relationship between depression, anxiety, MH, and HDP's QoL in larger and more diverse samples. This additional knowledge could provide valuable insights and guide effective strategies to improve the overall well-being of HDP.

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