

# A Systematic Review on Renal Transplantation: Is Quality of Life Compromised After Transplantation

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## ABSTRACT

More than eight hundred eight thousand Americans are affected by end-stage renal failure (ESRD); out of them, 31% have undergone a kidney transplant. Even though this transplantation comes with potential risk factors, there is a significant chance that this transplant will save the patient's life. There are legitimate benefits, however, there are concerns over the quality of life following the transplant. The main aim of the study is to find if the quality of life is affected post transplantation. If so to how much extend it is affected? Using keyword and Medical Subject Heading (Mesh) combinations five databases that were screened. The keywords used are kidney transplantation, renal transplant, quality of life, well-being. The articles were put through a rigorous screening and quality assessment process. This review is based on papers published within the last ten years, from 2013 to 2023, in English. We examined human study on kidney transplant recipients who had poor quality of life (QoL) post transplantation. This systematic review includes a total of 14 papers. This systematic review strongly concludes that in post renal transplantation patients' quality of life is compromised in both psychological and economical aspect. Consequently, further study on this crucial topic is required.

**Keywords:** Kidney transplantation; Renal transplant; Quality of life; Well-being

## 1. Introduction

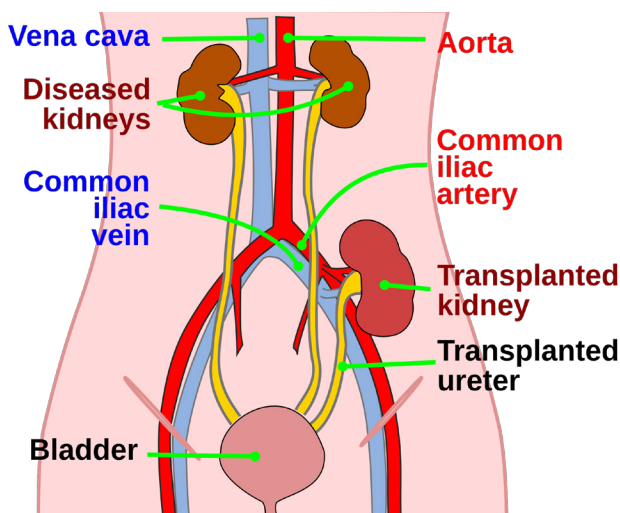
More than eight hundred eight thousand Americans are affected by end-stage renal failure (ESRD), of which, 31% received kidney trans-plant and 69% required dialysis. The probability of ESKD in men is 1.6 times higher than in women<sup>1</sup>. Kidney transplantation is considered the most appropriate form of therapy for the majority of patients with end-stage renal disease (ESRD), it is more economical than chronic dialysis treatment and gives a higher standard of life and survival rates<sup>2,3</sup>. Kidney transplant was a very constrained, risky, and

experimental therapeutic option is a common therapeutic practice in more than 80 nations today, compared to 50 years ago. Though technology can do much more, what was once restricted to a tiny number of people at a select few prestigious academic institutions in high-income economies is now changing lives as a standard procedure in the majority of high- and middle-income countries. USA, China, Brazil, and India are the countries where the most transplants are carried out, although Austria, the USA, Croatia, Norway, Portugal, and Spain have the highest transplantation rates. Worldwide, access to transplantation is still

severely limited<sup>4</sup>. Advancements in immunosuppressive control have produced good 1-year transplant survival (>95%) and a significant reduction in early acute rejection events<sup>5,6</sup>.

The two most common causes of renal failure are hypertension and diabetes. Additional causes of chronic kidney disease (CKD/ESRD) can be categorized as intrinsic renal (glomerulonephritis, focal-segmental glomerulosclerosis), postrenal (obstacle, reflux nephropathy), or prerenal (chronic or acute ischemia). Kidney transplant candidates are those with a glomerular filtration rate (GFR) of less than 30 mL/min/1.73 m, also known as stage 4 chronic kidney disease (CKD)<sup>7</sup>. The only effective treatment for end-stage renal disease is kidney transplantation, which can improve the quality of life for the majority of patients by addressing metabolic, haematological, endocrine, and immune system problems in addition to the illness's immunological function. Medical knowledge and technology have advanced in this area, yet issues still exist that limit the number of successful transplants performed. One of the biggest challenges, aside from the dearth of organs donated by live or deceased donors, is managing the pre- and post-transplant routes, which are frequently solely medical-surgical and ignore the significance of maintaining bodily and mental integrity. Rapid anatomical and physiological functioning is made possible by surgery in transplantation; nevertheless, cognitive and emotional integration is also required. A surgical procedure like a transplant involves a lot of stress, which puts one's continuity and integrity at risk. It also elicits strong emotions and has the potential to change a person's identity by generating psychopathology and psychosocial issues<sup>8-12</sup>. Haemorrhage, Thrombosis, Infection, Arterial Stenosis, Lymphocele, Urinoma, graft rejection and even skin cancer can occur as a complication of this transplantation<sup>13</sup>.

The schematic representation of kidney transplants is shown in the (Figure 1)<sup>14</sup>.



**Figure 1.** This figure shows a transplanted kidney.

Even with all of the risks, there is a significant chance that this transplant will save the patient's life. There are legitimate benefits, however, there are concerns over the quality of life following the transplant. The multifaceted idea of quality of life (QoL) refers to a person's overall state of well-being concerning the values, surroundings, cultural context, and social environment in which they live. Since QoL assesses factors other than bodily functioning and morbidity, it is acknowledged as a crucial indicator of overall<sup>15</sup>. According to the study, cultural factors, personality traits of both patients and

the relationship between the donor and recipient may all have an impact on the experience of psychopathological symptoms. In the US, anxiety and mood disorders affect 18.1% and 9.5% of adults annually, respectively. They have been connected to higher rates of disability, non-compliance, acute sickness, exacerbations of chronic illness, and even death in post-transplant individuals. Depression and anxiety are common ailments in the general public. In Nepal, 2100 adults between the ages of 18 and 65 participated in a nationwide cross-sectional study. The results showed that the quality of life was negatively correlated with the age and gender-adjusted point prevalence of anxiety (16.1%), depression (4.2%), and combined comorbidity (5.9%)<sup>16</sup>.

There are further studies have found that post-transplantation is associated with a higher rate of depression which would decrease the QoL post-transplantation. Although surgical techniques have consistently improved, therapeutic targets for preventing graft rejection have been identified, and post-transplant complications have decreased, there are still many unanswered questions and it is unknown how much the quality of life has been affected by transplantation. Furthermore, the general public is ignorant of ways to enhance the quality of life following a transplant. For the reasons outlined above, we conducted a thorough literature search to determine the association between quality of life and kidney transplantation and to provide a comprehensive understanding of this in this systematic research.

### 3. Materials and Methods

#### 3.1 Reporting Guidelines

This systematic research aims to identify if the quality of life is compromised in a patient's post-renal transplant. This systematic review has been conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines<sup>17</sup>. As secondary data from published articles were used, ethical approval was not considered.

#### 3.2 Search Strategy

The search was conducted online on PubMed, Google Scholar, Science Direct, BMC, and Cochrane. The last search on all databases was on November 29, 2023. Keywords that have been utilized for the websites include kidney transplantation, "renal transplant", "quality of life", and "well-being. Keywords presented in this systematic review were targeted by Medical Subject Headings search (Mesh). The Boolean method was used to combine the keywords to create a uniform search through the various databases mentioned above. We identified 4983 potentially eligible records across all the databases. Different search strategies used in various journals have been summarized in (Table 1).

#### 3.3 Eligibility Criteria

The studies that were selected are based on the participants, intervention and outcomes. Participants are the studies with adults from all ethnicities and genders undergone renal transplantation and the quality-of-life post-transplantation was measured. The outcomes are studies showing evidence of change in the QoL post-transplant.

#### 3.4 Inclusion Criteria

The systematic review's inclusion criteria encompassed research that juxtapose quality of life (QoL) with renal transplantation. The population of the studies was not restricted based on gender or ethnicity. We limited our search to English-

language records published online between November 29, 2013, and November 29, 2023, that are freely downloadable full texts and include participant identities. The investigation also includes literature, systematic reviews, observational studies, meta-analyses, and randomized controlled trials (RCTs).

**Table 1.** A summary of search strategies used in Pubmed, google scholar,cochrane,BMC and science Direct.

	Key word	Result	Filter Used	Search Strategy
PUBMED	“ K i d n e y transplantation,” “renal transplant”, “quality of life”, “well-being”	1045	2013-2023	kidney transplant or renal transplantation OR(( “Kidney Transplantation/classification”[Mesh] OR “Kidney Transplantation/ethics”[Mesh] OR “Kidney Transplantation/history”[Mesh] OR “Kidney Transplantation/methods”[Mesh] OR “Kidney Transplantation/mortality”[Mesh] OR “Kidney Transplantation/psychology”[Mesh] OR “Kidney Transplantation/rehabilitation”[Mesh] )) OR ( “Kidney Transplantation/adverse effects”[Mesh] OR “Kidney Transplantation/education”[Mesh] OR “Kidney Transplantation/instrumentation”[Mesh]OR “Kidney Transplantation/statistics and numerical data”[Mesh] OR “Kidney Transplantation/trends”[Mesh] ) AND quality of life or well-being or (( “Quality of Life/legislation and jurisprudence”[Mesh] OR “Quality of Life/psychology”[Mesh] )) AND “Socioeconomic Factors/history”[Mesh]
Google scholar	“ K i d n e y transplantation,” “renal transplant”, “quality of life”, “well-being”	237	Advanced search with all the keywords only in the title	Renal transplantation, Quality of life
Cochrane	“ K i d n e y transplantation,” “renal transplant”, “quality of life”, “well-being”	66	No filter used	Renal transplantation, Quality of life
BMC	“ K i d n e y transplantation,” “renal transplant”, “quality of life”, “well-being”	249	2022-2023	Renal transplantation, Quality of life
Science Direct	“ K i d n e y transplantation,” “renal transplant”, “quality of life”, “well-being”	3386	No filter used	Renal transplantation, Quality of life

### 3.5 Exclusion Criteria

Excluded from consideration were articles published before 2013, case reports, unpublished publications, editorials, publications written in languages other than English, and studies using animals or patients younger than nineteen. The population, intervention, comparison, and outcomes (PICO) criteria served as the foundation for our inclusion criteria.

### 3.6 Data Selection and Extraction

The first and second authors, who are distinct individuals, chose and extracted the pertinent studies on their own. Talking about the study’s design, the intervention that was used, the results that were measured, and how these related to our inclusion and exclusion criteria, the two researchers agreed on eligibility criteria. After duplicates were eliminated using EndNote (Clarivate, Philadelphia, PA) software, 71 articles were chosen from the five databases. Using the search technique and the inclusion and exclusion criteria, we found articles that were directly connected to the topic at the start of the screening process. After the articles were screened and examined by the researchers, 27 were chosen for quality assessment. These 27 were chosen for a quality assessment screening.

### 3.7 Quality Assessment

The 27 chosen articles are then assessed by two authors (the first and second authors) using tools such as the Newcastle-

Ottawa Scale adapted for cohort and case-control studies, The SANRA (scale for the assessment of narrative review articles) checklist for review articles<sup>18,19</sup> and JBI (The Joanna Briggs Institute Critical Appraisal Tools) for case reports. Two authors investigated the risk of bias using tools. Each study was assessed by these tools and scored accordingly. Studies with a minimum accepted scoring of >70% in checklists were selected. This selection has been briefly summarized in (Table 2<sup>20-31</sup> and Table 3<sup>32</sup>).

## 4. Results

A QoL and renal transplantation groups were screened for in all five databases. First, we used the search results to find papers. Our search was narrowed down to 4983 publications after we used several restrictions, including the English language, free-full text, keywords in the title, and our inclusion/exclusion criteria. The EndNote software (Clarivate, Philadelphia, PA) removed 877 duplicates before the studies were selected and reviewed. To ascertain whether the titles and abstracts of the 870 papers were relevant to our review, they underwent a thorough evaluation. 799 of the screened items were removed because they didn’t fit the topic, goals, inclusion, or exclusion criteria. As a result, 27 papers were selected for eligibility verification and quality assessment. This procedure is illustrated in full in (Figure 2) of the PRISMA flowchart.

**Table 2:** The selected articles after quality appraisal, SANRA, the scale for the assessment of narrative review articles.

Studies selected after review	Study type	Quality appraisal tool	Total score of the tool	Acceptable score
Tessa. S. S et al	Systematic review	SANRA	12	8
Vivian. V et al	Cross-sectional study	Newcastle-Ottawa scale	9	7
Chilcot et al <sup>21</sup>	Review article	SANRA	12	8

ShiMin Hu et al	Cross-sectional study	Newcastle-Ottawa scale	9	7
Masud.I et al	Cross-sectional study	Newcastle-Ottawa scale	9	7
Megawati et al	Cross-sectional study	Newcastle-Ottawa scale	9	7
Naafiah K.M	Cross-sectional study	Newcastle-Ottawa scale	9	7
Eliza et al	Cross-sectional study	Newcastle-Ottawa scale	9	7
Vinke JSJ et al <sup>27</sup>	Review article	SANRA	12	8
Jordakieva G <sup>28</sup>	Cross-sectional study	Newcastle-Ottawa scale	9	7
Marcin P et al	Review article	SANRA	12	8
Overbeck I et al	Cross-sectional study	Newcastle-Ottawa scale	9	7
Pasquale, et al	Cross-sectional study	Newcastle-Ottawa scale	9	7

**Table 3:** The selected articles after quality appraisal, JBI (The Joanna Briggs Institute Critical Appraisal Tools).

Studies selected after review	Study type	Quality appraisal tool	Included /Excluded
Witmanowski, H et al <sup>13</sup>	Case report	JBI Critical Appraisal Checklist for Case Reports	Included

**Table 4:** Details of the relevant 14 articles after quality appraisal.

Sl.No	Purpose	Author	Result
[20]	We looked through PubMed and Embase for studies that looked into how these variables changed in individuals who were 60 years of age or older after starting KRT. The summary metrics listed in the individual research were used to extract data. The ROBINS-I tool was used to evaluate the risk of bias.	Schoot TS et al <sup>19</sup>	There were sixteen observational studies (three KT recipients, three retrospective studies, thirteen dialysis patients, and nine prospective investigations). The findings indicate that for most older KT patients, QOL improves. Most patients' QOL improved or stayed steady after starting dialysis, but this is less common than after KT. A significant portion of elderly dialysis patients see a decline in their functional level. Moreover, the likelihood of severe falls increases with the initiation of dialysis. Following the onset of dialysis, nutritional status appears to improve.
[21]	Receivers of kidney transplants who are receiving treatment for end-stage renal disease have been found to have a high incidence of affective disorders. Although the number of kidney transplants performed in Latin America has increased dramatically in recent years, little information is available about the psychological problems that arise after the procedure. This study set out to determine the prevalence of depression and the demographic characteristics linked to depression in patients of kidney transplants in Panama	Vasquez V et al <sup>20</sup>	Among transplant patients, depression was present in 11.8% of cases. Ageing, having less education, and having an anxiety illness were all substantially and independently linked to depressed symptoms, according to linear regression analysis. The chance of depression was found to be significantly raised by anxiety and a perception of negative social support, as validated by logistic regression analysis.
[22]	In particular, this article assesses available treatments and provides an estimated prevalence, correlations, and outcomes of depression in this context.	Chilcot, Joseph et al <sup>21</sup>	Even with improvements in kidney transplantation, depression is still a common and troublesome comorbidity that is often disregarded. In this context, depression is associated with poor outcomes, such as lower graft survival. Although more empirical research is needed to fully understand the mechanisms underlying this association, nonadherence is a major explaining factor.
[23]	To investigate how depression and anxiety affect kidney transplant recipients' endogenous creatinine clearance rate and capacity for self-management.	ShiMin Hu et al	Of the patients, 12.5% had anxiety, 25% had depression, and 34.1% had a moderate degree of self-management and only 9.1% of them had endogenous creatinine clearance within the normal range. Age and the intensity of depression were shown to be negatively connected with the endogenous creatinine clearance rate, while body mass index, treatment management score, and psychosocial management score were found to be positively correlated. Patients without anxiety or depression had substantially greater endogenous creatinine clearance rate and psychosocial management ability than patients with anxiety and depression (all $P < 0.05$ ).
[24]	Health-related quality of life is becoming a key indicator of how well a treatment is working. Here, quality of life metrics were assessed and compared between patients receiving renal transplants and those with chronic kidney disease receiving maintenance hemodialysis or not.	Masud I et al	Patients who had transplants scored higher on quality-of-life measures; some values, such as physical function ( $P = .85$ ) and social function ( $P = .25$ ), were comparable to those of healthy control patients. The results showed that the scores for physical function were $100 \pm 12$ , $69 \pm 27$ , $37 \pm 28$ , and $91 \pm 10$ ( $P < .001$ ); for pain, the scores were $94 \pm 12$ , $44 \pm 17$ , $30 \pm 14$ , and $69 \pm 29$ ( $P < .001$ ); for social function, the scores were $99 \pm 11$ , $61 \pm 46$ , $24 \pm 15$ , and $70 \pm 28$ ( $P < .001$ ); and for energy/fatigue healthy control, people without dialysis for chronic renal disease, people undergoing haemodialysis, and those receiving a transplant, in that order.
[25]	Finding out the quality of life (QoL) and contributing factors for patients undergoing kidney transplantation was the aim of this study.	Megawati et al	At Cipto Mangunkusumo General Hospital in Jakarta, Indonesia, the QoLs of kidney transplant patients were largely good (71.8%). Age ( $p=0.002$ ), educational attainment ( $p=0.001$ ), work status ( $p=0.010$ ), family support ( $p=0.024$ ), and immunosuppressant medication adherence ( $p=0.009$ ) were the factors influencing the patients' quality of life. The degree of education was the main factor influencing QoL (odds ratio = 11.490).



[26]	Assessing the overall quality of life (QoL) of patients who have had a kidney transplant within the last three years is the goal. This index will be correlated with several demographic variables, including age, gender, marital status, and educational attainment. Additionally, the QoL score will be correlated with the patient's self-reported health status.	Naafiah K. Mallick et al	The questionnaire was given to 79 patients in all, with a mean age of 35±11 years and a gender distribution of 84.5% male and 15.5% female in our study sample. The majority of kidney donors (30.9%) were sisters, with 98.4% of patients receiving their kidneys from relatives. The bulk of patients (54.4%) reported being from Punjab, with the remaining patients coming from remote rural locations. Hepatitis C, IHD, HTN, depression, and other systemic/psychological illnesses were reported in an estimated 62.5% of the patients. These patients had a mean global score of 79.21, which was further divided into four domains: environmental domain (74.75), psychological domain (78.99), social domain (82.70), and physical domain (80.40).
[27]	To evaluate the standard of living of recipients of kidney transplants in the State of Amazonas.	Elisa et al	The results showed a range of quality of life scores from 36.5 to 83.1. Specific renal disease domains have shown to be preferable to generic ones in terms of quality of life. With scores of 36.5, 53.7, 52.4, and 55.1, respectively, the most compromised areas were job situation, sleep, physical function, and emotional function. These areas also showed moderate to substantial correlations with one another.
[28]	The diagnosis, prevalence, and clinical implications of ID following kidney transplantation will be covered in this review along with possible underlying pathophysiological pathways and suggested directions for further research.	Vinke et al <sup>27</sup>	Among KTRs, ID is very common and a determinant risk factor for early mortality in this population.
[29]	The purpose of this study was to give patients who had received kidney transplants an update on their employment status, quality of life, self-reported mental health, workability, and related characteristics	Jordakieva et al <sup>28</sup>	Only two health-related variables-feet of weariness and involvement in psychological counselling following KTx-showed significant differences in work status. The mean Workability Index score among employed individuals was 36.82 (standard deviation (SD) = 6.13), with 61% of scores falling into the workability category's "good" range. There were notable variations in the workability score, with the mean value of WAS for working individuals being twice as high as that of jobless people.
[30]	This article's goal was to summarize what is now known about the quality of life and anxiety and depression symptoms that occur in living kidney recipients and donors	Marcini P et al	According to this study, givers typically have greater mental health than beneficiaries. Furthermore, in the post-transplant period, both donors and recipients experience a decrease in anxiety and despair as well as an improvement in their quality of life when compared to before surgery.
[31]	This study compares the quality of life between individuals waiting for a transplant who have end-stage renal disease (ESRD) and those who have had a kidney transplant.	Overback et al	In terms of physical functioning (P ≤.001), overall health perceptions (P ≤.01), social functioning (P ≤.01), and physical summary value (P ≤.001), the SF-36 showed considerably higher values for transplant patients. There were no discernible variations between the two samples according to the job data and other tests.
[32]	The purpose of this paper is to provide a comprehensive overview of the literature published in the past twelve years (2006-2018) about the psychological and psychopathological aspects of adult kidney transplant recipients' illness awareness.	Pasquale, et al	The most prevalent conditions affecting kidney transplant recipients that can impact disease progression and graft survival are anxiety and depression.
[33]	The document includes basic information on the epidemiology, possible risk factors, therapy, and prognosis of skin malignancies in recipients of organ transplants. The report also describes a patient who, three years after receiving a kidney transplant, acquired cutaneous squamous cell carcinoma.	Witmanowski H et al <sup>32</sup>	The risk of skin cancer is higher in transplant recipients than in the general population. As a result, recipients of organ transplants should exercise greater oncological caution. Recurrence of skin cancer is frequently seen in patients who have had treatment for the disease. Consequently, regular dermatological care is crucial for enabling early diagnosis and efficient therapy, which in turn helps to prevent the possibility of a cancer recurrence.

**5. Discussion**

With the evolution of the modern era in medicine and surgery, End-stage renal disease has found an alternative treatment with renal transplantation. As their renal function gradually declines, individuals with chronic kidney disease (CKD) experience a degradation of their quality of life (QOL) as well as an increased risk of morbidity and mortality. Patients with chronic kidney disease (CKD), which includes those receiving dialysis, bear heavy physical and psychological loads such as fatigue, pruritus, insomnia, pain, sadness, and restless legs syndrome. These conditions eventually deteriorate physical and psychosocial health. For these populations, renal transplantation will be a lifesaver. Several studies have explained the uses of renal transplantation in recent days. The main goal of this treatment is to provide an increased survival rate and quality of life. The studies evaluated in this systematic review have another aspect

of renal transplantation in satisfying the quality of life. This research focuses on the various advent events to be faced after the surgery and provides a clear view of how the quality of life is affected.

**5.1 Psychological reliability**

This is the ability of a person to perform professional activities in difficult and extreme situations as successfully as under normal conditions is frequently associated with the notion of psychological stability.<sup>32</sup>

**5.2 Mental Distress**

Pasquale, et al study explains that for end-stage kidney disease, kidney transplantation is a proven treatment. Nonetheless, it is a complicated psychological experience that may result in psychopathology and mental anguish.<sup>32</sup>

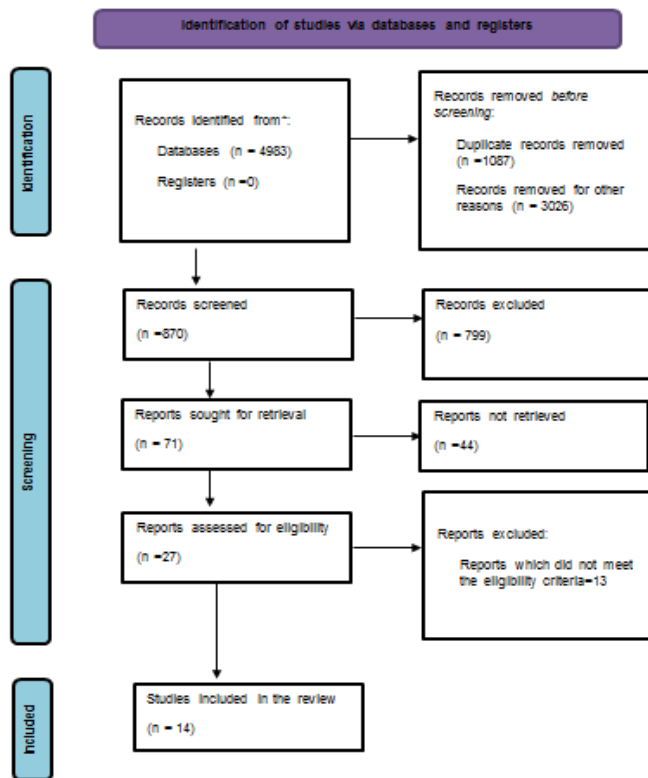


Figure 2: Flowchart of the PRISMA.

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

A total of 14 articles made it to the final review<sup>20-32</sup>. (Table 4) contains the details of the relevant 14 articles included<sup>20-32</sup>.

### 5.3 Depression Feelings and Intellectual Problems

Research on the cognitive abilities of kidney transplant recipients has revealed cognitive deficits, particularly in verbal memory and executive function-disabilities that are frequently linked to mood problems. Cognitive Impairments and Depression Symptoms: These negative effects can linger and negatively affect all facets of life.<sup>29,32</sup>

### 5.4 Depression, anxiety, and sleep disorders

After receiving a kidney transplant, patients frequently experience poor sleep, which is one of the things that negatively impacts their quality of life. This issue is linked to both a higher level of medical comorbidity and emotional fragility<sup>27,30,32</sup>.

According to Vivian et al study's findings, anxiety raises the likelihood that transplant recipients would experience depression and significantly predicts its severity. Furthermore, we discovered that the perception of inadequate social support was linked to a higher chance of depression. This finding is in line with earlier research showing that social support-related factors, such as living alone, having a less supportive family environment, and having lower marital satisfaction, are strongly associated with an increased risk of depression in patients undergoing renal transplantation and end-stage renal disease<sup>21</sup>. ShiMin Hu et al findings demonstrated that patients' capacity for self-management, particularly in the psychosocial domain, could be severely compromised by both depression and anxiety. The general patient data from this investigation, as well as the associations between anxiety and depression and the capacity for self-management and endogenous creatinine clearance, were examined<sup>23,26</sup>.

Even with improvements in kidney transplantation, depression is still a common and troublesome comorbidity that is often disregarded. In this context, depression is associated with poor outcomes, such as lower graft survival. Although more empirical research is needed to fully understand the mechanisms underlying this association, nonadherence is a major explaining factor<sup>22</sup>.

### 5.5 Employment status:

Eliza et al research concluded that the employment status has the lowest mean after the transplantation which means the employment status is affected after renal transplantation<sup>27,32</sup>. On the other hand, Jordakieva et al states that there is good employment in post-transplantation individual which is controversial<sup>29</sup>. According to certain other research, kidney transplants improve life quality<sup>20,24,25,31</sup>.

### 5.6 Anaemia:

Kidney transplant recipients (KTRs) have a significant prevalence of iron insufficiency (ID), which has been independently linked to an increased risk of death<sup>28</sup>. The possible mechanism of iron deficiency in renal transplant is postulated in (Figure 3).

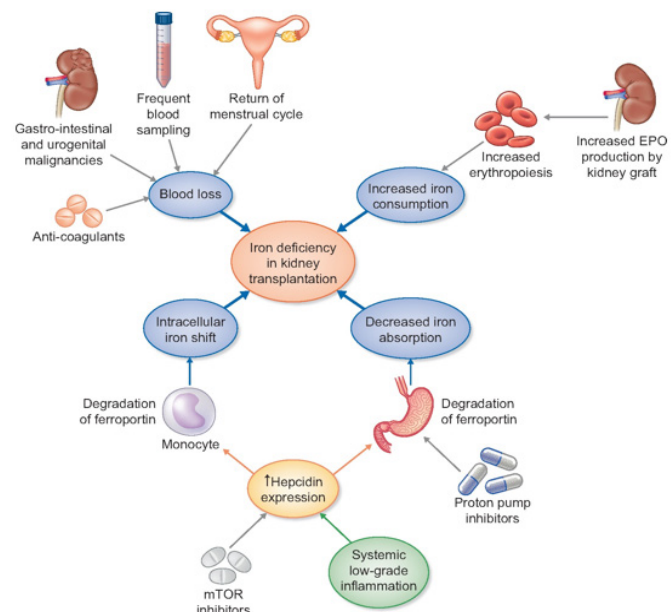


Figure 3: Mechanism of iron deficiency in renal transplant<sup>28</sup>

### 5.7 Squamous cell carcinoma in Renal transplantation

The risk of skin cancer is higher in transplant recipients than in the general population. As a result, recipients of organ transplants should exercise greater oncological caution. Recurrence of skin cancer is frequently seen in patients who have had treatment for the disease. To prevent future cancer recurrence, it is crucial to have frequent dermatological control, which allows for early identification and effective therapy.<sup>33</sup>

Organ transplantation is typically the final therapeutic option for patients with chronic renal disease. The procedures leading up to and including the transplant place a significant psychological strain on the patient, increasing the risk of psychopathology developing. The literature emphasizes the necessity to assess, through insufficient screening, the potential existence of psychopathology in kidney transplant recipients, including anxiety, depression, cognitive impairment, and sleep disorders. These conditions can negatively impact the

recipients' ability to comply with their treatment plans. The most prevalent conditions affecting kidney transplant recipients that can impact the course of the disease and the viability of the graft are anxiety and depression. Anxiety is a state of awareness and fear that intensifies in transplant patients' daily lives in response to infections, medication side effects, and other circumstances that expose the patient to physical suffering until the fear of rejection. Given the aforementioned, the findings from studies can be summarized as though kidney transplantation is meant to improve the quality of life, somehow it is affecting the quality of life in one or the other way.

## 6. Limitations

We observed a few limitations in our systematic review. The first limitation is supplied by the criteria set forth as screening paper filters. By incorporating human research conducted between 20130 and 2023 and by solely utilizing free full-text publications published in English, the total number of resources is reduced. Second, a range of study designs were selected, such as meta-analyses, systematic reviews, randomized clinical trials, and observational studies. Because of this variability in the samples and statistical methods, our revision is susceptible to bias. Third, several investigations were carried out using tiny sample sizes because of the procedure's extreme complexity. In this case, it is critical to stress that bigger sample sizes are better for obtaining more definitive findings about the impact of kidney transplantation on quality of life.

## 7. Conclusions

With the blooming of the medical era, end-stage renal failure came to an end with the invention of renal transplantation. With the increased transplantation procedures all over the world in the advent of improving the quality of life, researchers forget to address that the psychological aspect of a human is also included under the umbrella of quality of life. This systematic review aims to find out whether the quality of life is compromised in the view of prolonging the life of end-stage kidney disease patients. As analyzed from the data, the psychological aspect of life is seriously compromised. It is well clear from the research analyzed that post-transplant patients suffer from anxiety, depression and sleep disturbances which in turn affect the post-care and even result in transplant rejection. It is also found that there is a presence of iron deficiency anaemia in post-transplantation individuals. Not only limited to this renal transplantation has been noted to have increased incidence of squamous cell carcinoma. In addition to this, it also affects the employment status of post-transplant individuals thus affecting their economic status. Thus, overall renal transplantation affects not only the psychological state of an individual, it also has effect over the physiological and economic state which concluded the need for the study. Additional recommendations include supervising and piloting more studies, particularly cohorts and RCTs with larger samples; a combination of psychological management and counselling sessions on how to cope with post-transplantation workplace assessment; and education about involvement in yoga and exercises to gain relief and prevent recurrence by educating the mechanism of the disease and to have frequent dermatological control, which allows for early identification and effective therapy. These concepts are brought up to help readers understand the associated risk factors in the transplantation thereby not missing the after-effects in the quality of life which is promised to be improved and potentially to fill in any gaps and inconsistencies discovered during this systematic

review. To improve and elaborate future evidence, it is vital to note that further research on managing the psychological aspect should be on note.

## Author Contributions

I would like to thank my co-authors for their contributions to the development of this systematic review. I acknowledge all parties equally assisting in the development of this systematic review. Conceptualization, Zareen Zohara and Ajeeth Rehman Abdul Jaffar Azad; methodology, Zareen Zohara and Ajeeth Rehman Abdul Jaffar Azad; software, Faizal Khan.; validation, Zareen Zohara and Ajeeth Rehman Abdul Jaffar Azad.; formal analysis, Zareen Zohara.; investigation, Zareen Zohara, Faizal Khan and Ajeeth Rehman Abdul Jaffar Azad.; resources, Zareen Zohara and Ajeeth Rehman Abdul Jaffar Azad.; data curation, Zareen Zohara.; writing-original draft preparation, Zareen Zohara.; writing-review and editing, Ajeeth Rehman Abdul Jaffar Azad and Arun Mohan.; visualization, Zareen Zohara and Arun Mohan.; supervision, Faizal Khan.; project administration Zareen Zohara. All authors have read and agreed to the published version of the manuscript."

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## Conflicts of Interest

The authors declare no conflict of interest.

## Appendix: Figure A3

Iron deficiency causes in renal transplants. Hcpidin overexpression in KTRs is facilitated by mTOR inhibitors and low-grade inflammation. Hcpidin inhibits the iron exporter ferroprotein on enterocytes, which decreases the absorption of iron from the stomach. Hcpidin also lowers iron availability by preventing monocytes from exporting iron. In the meantime, KTRs need and consume more iron because erythropoiesis is encouraged by fresh EPO production. Blood loss is a side effect of anticoagulant medication use, frequent blood draws, and in certain cases, urogenital and gastrointestinal cancers. Another reason for blood loss in female KTRs of reproductive age is the return of their menstrual cycle. Lastly, PPIs reduce the absorption of iron from food<sup>28</sup>.

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