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Long-Term Quality of Life of Living Kidney Donors Post Nephrectomy: An Integrative Review

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ABSTRACT

Background : In 2018, about 36,528 kidney transplants were performed, and of these numbers, 39% were from living donors. Transplantation through living kidney donors has been widely advocated to address the global shortage of organs. Living kidney transplantation, compared to the deceased donor, provides better graft and survival outcomes for recipients. While there is evidence on the outcomes of kidney recipients, there is limited information on living kidney donors after nephrectomy.

Purpose: Guided by Roy Adaptation Model, the purpose was to examine the long-term quality of life of living kidney donors (LKSD) after nephrectomy.

Method: An integrative research review was conducted using electronic databases PubMed and the Cumulative Index of Nursing and Allied Health Literature. Peer-reviewed articles published in English from 2015-2018, studies on LKD only, related to LKD' quality of life (QoL) or health-related quality of life, and must have a minimum of one-year follow-up post nephrectomy were included.

Results: Initial search of the literature generated 166 studies, and six articles were included in this review. The overall long-term quality of LKDs was comparable to higher than the general population. However, women were found to have worse psychosocial QoL.

Conclusion: Findings suggest that continual evaluation of LKDs post nephrectomy is warranted and that more research is needed on the long-term outcomes of LKDs. Although the LKDs condition after the nephrectomy is overshadowed by the recipients' complexities and acuteness of their ESRD before the transplantation as well as ensuring the success of the kidney transplantation afterward

KEYWORDS : living kidney donors, long-term quality of life, post-nephrectomy by comma

I. INTRODUCTION

Kidney disease is the ninth leading cause of death in the United States (US) [1]. Chronic kidney disease (CKD) is an under-recognized public health crisis even though the rates of people with hypertension and diabetes are increasing [2]. There are approximately 30 million people with CKD, translating to approximately 15% of the population [2]. End-stage renal disease (ESRD) occurs when CKD reaches an advanced stage, causing an irreversible loss of kidney function [3]. In 2016, Medicare spends about \$114B in caring for patients with CKD and ESRD [4]. In 2016, over half a million people were receiving treatment for ESRD in the U. S. The current modes of treatment for ESRD include peritoneal dialysis, hemodialysis, or a kidney transplant. Kidney transplantation is the most optimal choice of the three. There are approximately 95,479 kidney transplants performed in 2018 worldwide [5]. A kidney transplant involves placing a healthy kidney taken from either a deceased donor or a living donor to a kidney recipient [2]. It also requires a surgical procedure to remove the

kidney from the donor. While there is evidence on the outcomes of kidney recipients, there is limited information on living kidney donors after nephrectomy. Therefore, we aimed to perform an integrative research review (IRR) of the literature to examine the evidence on the long-term quality of life of living kidney donors' post-nephrectomy. We defined long-term as duration of one year and over after undergoing nephrectomy.

II. BACKGROUND

End-stage renal disease is a debilitating disease that has no known cure. Kidney transplantation is the only choice to restore kidney function. In the US, there were over 113,000 men, women, and children on the national transplant list in January 2019 [6]. In 2018, about 36,528 kidney transplants were performed, and of these numbers, 39% were from living donors [6]. As the number of people in the waiting list increases, the number of donors and transplant remain very slow [6]. Transplantation through living kidney donors has been widely advocated to address the global shortage of organs. In addition, living kidney transplantation, compared to the deceased donor, provides better graft and survival outcomes for recipients [2]. However, living kidney donors (LKD) must accept the risks and potential consequences associated with nephrectomy. Ethically, the risk and benefits of kidney donation are weighed heavily towards reducing harm on the donors' part. Physical, psychological, and social harm on the donor must be minimized, and the risk should not be greater than that expected from nephrectomy. Healthcare professionals have to ensure that those who donate are not placed in high-risk situations and can still live a normal, healthy lifestyle after nephrectomy. Investigation of the long-term outcomes of living kidney donation is important to continue to encourage and educate the population on the importance of donation.

PICOT Question: The research question is, what is the long-term (T) quality of life (O) of living kidney donors (P) after undergoing donor nephrectomy (I)?

III. THEORETICAL FRAMEWORK

The Roy Adaptation Model (RAM) was chosen to guide this IRR. The RAM describes a person as a bio-psycho-social being that interacts with the constant changing environment [7]. A person uses innate and acquired mechanisms to adapt to uncertainty. In conceptualizing the RAM to this IRR, the living kidney donor must interact with the internal and external stimuli related to kidney donation by using one or both of their control processes post-nephrectomy. The LKDs must use some or all of the four adaptive processes- physiologic, self-concept, role function, interdependence to adapt post-nephrectomy. Depending on the LKD's degree of adaptation, it may or may not impact their long-term QoL.

IV. METHOD

This is an integrative research review. Electronic databases searched were PubMed and the Cumulative Index of Nursing and Allied Health Literature (CINAHL). Keywords used in the search were quality of life AND living donor, living kidney donor AND after nephrectomy, living kidney donors AND quality of life AND post nephrectomy. Inclusion criteria included peer-reviewed articles published or translated in English from 2015-2018, studies on living kidney donors only, studies related to LKD's quality of life or health-related quality of life, and must have a minimum of one-year follow-up post nephrectomy. Abstracts, dissertations, periodicals, editorial, or those not in the English language, and studies of living kidney donors that were not related to the quality of life, follow-up is less than one year, and other studies on donors not related to QoL or HR-QoL were excluded.

Data Extraction: An evaluation table was used to systematically review each article (Table 1). The following information was extracted from each article - authors and year of publication, design and method, variables and measures used, and findings. Melnyk and Fineout-Overholt's (2015) hierarchy of evidence was used to rate the type of evidence of each article. It was decided to include the systematic review and meta-analysis article because of the level of evidence in each.

Quality Appraisal : Quality appraisal was completed using the Joanna Briggs Critical Appraisal for specific study design. Three authors (LM, SV, and MCS) completed the quality appraisal of each article. An appraisal was completed for each article to confirm the quality and trustworthiness of the data presented. All articles were included regardless of the quality appraisal due to limited literature found.

V. RESULTS

Articles Characteristics: An initial search of the literature generated 166 studies, and six articles were found to fit the inclusion and exclusion criteria for this IRR (See PRISMA Diagram). Articles consisted of one randomized controlled trial, and five articles were cross-sectional, descriptive and observational, correlational,

and comparative study designs. The level of evidence (LOE) of one article was level II. The rest of the articles have a LOE of VI. All studies were conducted outside the U. S.

Sample characteristics: There are 1063 participants total in all the articles included. The sample sizes varied from 52-501 participants. The mean age of participants in the articles ranged from 49 years to 61.5 years. Donors were predominantly females. The longest duration of follow-up post- surgery was a mean of 10 years (Meyer et al., 201; Janki, et al. 2014).

Long-term Quality of Life: All the articles included used the Short-Form -36 (SF-36) to assess the long-term QoL. The SF-36 survey has eight subscales including physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), mental health (MH), role emotional (RE), social functioning (SF). These subscales were grouped into physical component (PCS) and mental component (MCS). The first four subscales (PF, RP, BP, GH) were categorized under PCS, whereas the last four into MCS (VT, MH, RE, SF). Table 2 presents the results of the physical and psychosocial QoL components for each article.

VI. DISCUSSION

This IRR was conducted to examine evidence on the long-term QoL of LKDs after nephrectomy. Overall, our findings showed that LKDs maintain a long term QoL after nephrectomy. These findings were consistent with several studies of living liver donors [8-10]. Morooka et al. [9] reported that living liver donors in Japan showed QoL outcomes improved post-donation. In contrast, Shen et al.'s [10] study on living liver donors showed that PCS QoL is comparable with the general population at 3 or 4 years post-donation. All studies, however, reported a decline in LKDs PCS early post nephrectomy. This finding is expected as LKDs are physically and physiologically recovering from a major surgical procedure. A similar finding is noted in studies of living liver donors that show a decline in physical function [11] or a significantly poorer physical QoL during their first two years post-donation [10]. Results were mixed on some of the physical (PCS) and psychosocial (MCS) subscales of QoL among LKDs after nephrectomy. Meyer et al. [12] showed that females scored lower in both RP and RE subscales, whereas Sommerer et al. [13] found that older females had significantly lower MCS scores compared to men. An explanation of this finding is that there are social factors that put women at risk for poorer mental health than men post-nephrectomy. Women also tend to internalize difficult feelings, whereas men are more likely to act out their emotions. A study of Taiwanese LKDs reports a poorer QoL in vitality and mental health subscales compared to the general population [10]. In the study by Janki et al. [14], LKDs noted significant decrease in some PCS and MCS subscales. This is in contrast with Maple et al.'s [15] study in which 93 LKDs felt positive about donating yet had no significant change in psychosocial outcomes one year after post-donation.

This IRR has significant implications for nurses, including advanced practice nursing (APN). Nurses may have the opportunity to care for kidney transplant recipients and the LKDs after nephrectomy. As the incidence of renal failure increases, chances are nurses will take care of someone who will need kidney transplantation or someone who will donate their kidney. Although the LKDs condition after the nephrectomy is overshadowed by the recipients' complexities and acuteness of their ESRD before the transplantation as well as ensuring the success of the kidney transplantation afterward, it is important to ensure LKDs short and long-term outcomes after nephrectomy. Some questions that LKDs may ask before donating may include what will happen to their kidney function after one of their kidneys is removed or will they be back to "normal" after donating. These questions are valid, and nurses must be able to answer them using evidence-based information. Findings from this IRR may be useful in educating potential donors not just of the altruistic benefits of this procedure but also the risks involved with undergoing nephrectomy for kidney transplantation. Because of the lack of organs available, there will be an increased demand for LKD. Therefore, nurses must be equipped with information to explain these benefits and long-term outcomes to potential donors. This IRR offers an excellent research opportunity for nurses. There is much needed research on LKDs outcomes, particularly in the US. Results from this IRR noted that females have worse or lower long-term mental health QoL scores. There is a need to explore this to determine factors that contribute to lower mental health. Considering that the US has a significant increase in population death with a diagnosis of kidney disease [1], it is important to initiate more US studies. By educating the population, there can be a general knowledge of the importance of living kidney donation.

There are limitations acknowledged in this IRR. These include articles that were mostly observational and cross sectional design, leading to a lower level of evidence. Sample sizes were small, which limits generalizability. Not all articles separately reported all the values on the QoL subscales, hence difficulty to determining which of the PCS or MCS subscales is affected. This IRR only examined the QoL of LKDs post-nephrectomy. It did not evaluate long-term clinical data such as renal function, risk of developing hypertension, other comorbidities, and mortality of the LKDs, which are important data to collect.

VII. CONCLUSION

In summary, there is evidence in the published literature to suggest that LKDs may maintain a healthy quality of life years after undergoing nephrectomy. Although there is additional research needed, awareness of these findings could help practitioners educate potential donors and the public about the benefit of kidney donation.

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FIGURE 1.
PRISMA Diagram

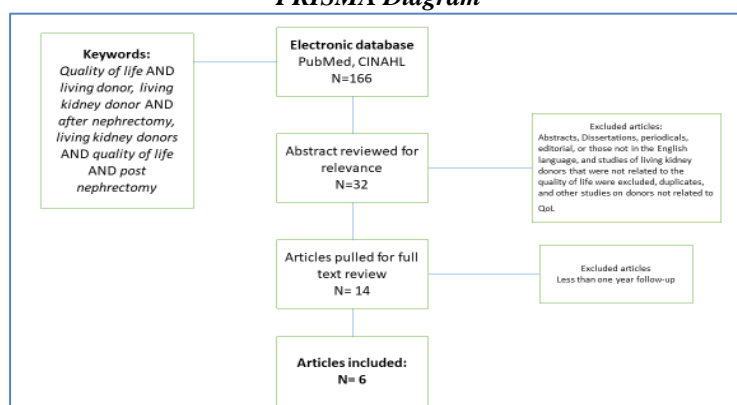


TABLE 1.

Evaluation Table.

Authors (yr.) Country of Publication	Design/ Method	Sample/settings	Duration of follow-up	Variables and Measurements	Findings
Sommerer et al. (2018) Germany	Cross-sectional Survey	211 living donors responded	Mean – 9.5 years (SD-5.2)	Health-related QoL – SF-36 Fatigue - MFI-20 Depression - PHQ	Compared to the general German population, living donors showed significantly higher results in PCS and significantly lower results in MCS. Physical Component Scale (PCS) HRQoL was comparable in female and male donors, except for mental (MCS), which was significantly worse in females. Female donors aged 51- to 60-year-old contributed to lower MCS scores and in the subscale of MH. In both genders, a 26% decrease of renal function of 26% observed after donation. De novo anti-hypertensive was introduced in 28.3% of women and 36.5% of men. Female donors aged 40–59 years demonstrated more fatigue.
Han et al (2017) Singapore	Cross-sectional Survey	82 LKD with or without post-donation renal impairment (PDRI) Mean age =50.2 (11.2) years	Median follow-up period was 5.7 years after donor nephrectomy	Health-related QoL – 36 SF	LKDs with PDFI had lower mean scores in the domains of PF, RP, BP, and RE; however, mean SF-36 scores of LKDs were not significantly (all $p>.05$) different between these two groups in all the domains. The overall mean HRQoL scores were comparable to the local population reference. Scores in GH, VT and MH subscales were lower but seen across three groups compared (general population, LKD with and with PDRI).
Klop et al (2017) The Netherlands	Descriptive, observational	501 kidney donors from two RCT and one prospective study Mean age – 50.9 (SD=12.6)	Follow-up at 1, 3, 6 and 12 months post-operatively	Quality of life – SF-36	PCS - at 1-year, there is still a small decrease ($d=-0.25$, $p=.007$) in PCS scores compared to baseline. MCS – scores showed a small increase after 1 year.

Shakya et al (2016) Nepal	Cross-sectional comparative	59 kidney donors and 59 healthy participants as reference point Mean age -51.5 (SD=10.7) in donor; 51.1 (SD=11.4) in reference group; 78% females in both group	Median time lapse since donation - 3.67 (range 1.75 -5.67) years.	QoL- SF-36v2	Donors <50 years of age, male, educated and employed donors were found to have better QOL than their counterparts. The comparison of donors and references showed better scores in the donors' QOL with significant differences in general health, mental health and mental component score.
Meyer et al (2016) Norway	Cross-sectional	217 kidney donors who donated at Oslo University Hospital between 2001-2004	Median follow-up – 10 years (range 8.5-12 years)	QoL - QoL- Short-Form Health Survey (SF-36v2) –[8 subscales] translated to Norwegian Fatigue – MFI translated in Norwegian Donor-specific question	Donors scored high on QOL with mean scores between 63.9 and 91.4 (scale 1–100) for the 8 subscales. Females scored significantly lower in the RP and RE domains. Recognition from family and friends was associated with higher QOL scores in four subscales – RP, BP, VT, RE.
Janki et al (2015) The Netherlands	RCT	100 donors (at baseline); 10-year F/U= 90 (70 for QoL)	Median follow-up time was 10-years	QoL – SF36 Renal function HTN Fatigue – MFI 20 Survival – Municipal Registry	94% still alive at 10-year follow-up; After 10 yrs. 38% of the donors lost 6-34% of the creatinine level compared to baseline; none developed ESRD; a significant decrease in kidney function of 12.9 ml/min (P<0.001) at follow-up QoL - 10-year follow – up scores of the following dimensions were significantly decreased compared to baseline: physical function domain (-7.0, P=0.001), bodily pain (-7.0, P= 0.001), general health (-7.1, P= 0.001), and vitality (-4.1, P=0.028)

Table 2.

Comparison between Physical and Psychosocial QoL

Studies	Quality of Life	
	Physical QoL	Psychosocial QoL
Sommerer et al (2018)	Male and female donors comparable results	<i>Female donors ages 51-60 yrs. of age showed significantly worse c/t male donors and to female general population</i>
Klop et al (2018)	Small decrease (effect size - -0.24); lower PCS was related to age and BMI Baseline QoL was higher c/w general Dutch population.	Small increase (effect size =0.32). Baseline QoL was higher c/w general Dutch population

Han et al (2017)	No significant difference between HrQOL scores as measured by SF36 in all its domains between LKDs with and without PRFI	
Meyer et al (2016)	Females scored significantly lower in the domain role physical. Recognition from family and friends was associated with higher QoL scores on the following domains – RP, BP, VT	Females scored significantly lower in the domain role emotional. Recognition from family and friends was associated with higher QoL scores in RE domain
Shakya et al (2016)	The overall comparison of kidney donors and participants in the reference group showed no significant difference in PF, RP, BP, VT, SF, RE and PCS scores.	Although the donors scored higher in all the domains, the difference was significant in GH, MH and MCS
Janki et al (2015)	QOL showed significant clinically relevant decreases of 10-year follow-up scores in SF-36 dimensions of physical function ($p<0.001$), bodily pain ($p=0.001$), general health ($p<0.001$), and vitality ($p=0.028$).	