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Research Article

**PREVALENCE OF DEPRESSION AMONG HEMODIALYSIS
PATIENTS IN AL-MADINAH AL-MUNAWARAH SAUDI
ARABIA: A CROSS-SECTIONAL STUDY****Tariq Awadh Almuadwi, Asma Mutni Almutairi, Hatim Alharbi, Othman Atallah Alharbi,
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Abstract:

Background: Psychological health is as important as physical health, which needs more attention to provide the high quality of life to patients with chronic diseases. Kidney disease is among the top-stress illnesses because of the chronicity and long-term management of the disease. Depression is common in CKD and is associated with a significant risk of adverse consequences. Anxiety and depression are the two most common entities in the hemodialysis population. **Methods:** A cross-sectional study had been conducted by using a convenience sample. A total of 399 hemodialytic patients in Almadinah, Saudi Arabia had been included in this study. The data were analyzed using Statistical Packages for Social Sciences (SPSS) version 21. A p-value cut off point of 0.05 at 95% CI used to determine statistical significance. Numbers and percentages were used to presents all categorical variables while mean \pm standard deviation were used to summarize all continuous variables. We used Quick Inventory of Depressive Symptomatology (QIDS SR-16) to measure the depression of hemodialysis patients. (29) The analyses that measure the association between socio-demographic characteristics and depression level among hemodialysis patients by using chi-square test. **Results:** There were 399 patients who were voluntarily involved in this study. Age range of the patients were from 13 to 84 years old where 51 (12.8%) of the patients were from 30 years or less age group, 74 (18.5%) were from 31 – 40 years' age group, 72 (18.0%) were from 41 – 50 years' age group, 97 (24.3%) were from 51 – 60 years' age group and 105 (26.3%) were in more than 60 years' age group. Majority of them were males as 210 (52.6%) while 189 (47.4%) were females. It was revealed that the prevalence of depression among hemodialytic patients was 69.2% where no depression had 30.8%, Mild depression had 35.3%, moderate depression had 24.1%, Severe depression had 7.5% and very severe with 2.3%. Significant relationship found at age group in years, gender and marital status against the level of depression.

Conclusion: In this study two out three hemodialytic patients were depressed. This prevalence of depression was still at high and this causes more hospitalization and increased of mortality rates among patients. In this regard, extra counseling and monitoring are needed for those patients. Preemptive measures are necessary for those hemodialytic participants with suspected depressive symptoms.

Keywords: Depression, Hemodialysis, Chronic Kidney Disease, Prevalence, Saudi Arabia ,

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INTRODUCTION:

Psychological health is an essential part of well-being and quality of life of individuals have chronic, potentially life-threatening illness including chronic kidney disease (CKD). In fact, CKD is becoming a major public health concern. The prevalence of end stage renal disease (ESRD) globally is expected to continue to rising(1) . The prevalence of renal diseases is high in the Gulf region (2) . In Saudi Arabia, kidney diseases are among the top causes of morbidity and mortality due to long-term complication and management. Statistics have shown that the prevalence of kidney diseases in the Saudi Arabia is constantly increasing (3) . For the past twenty years number of dialysis patients in Saudi Arabia is significantly increase (4) (5). The high prevalence of kidney diseases in the Saudi Arabia may also indicate high prevalence of depression associated with it ; however, compared to studies conducted in other parts of world , the prevalence of depression disorder and depressive symptoms among dialysis patients in Saudi Arabia is relatively low (6) . This is may be due to religious beliefs that is particularly helpful in coping with the life changes brought on by CKD, and a treatment that maintains life (7) . It also might be due to the depression and uremia have same symptoms that may lead to difficulty in diagnosis of depression. The depressive symptoms loss of appetite or weight change , change in sleep , and pains are sometime difficult to differentiation from the uremic symptoms of encephalopathy, decrease appetite and sleep disturbance (8) (9) (10) . However , Depression is common in CKD and is associated with a significant risk of adverse outcomes (11) . Anxiety and depression are two most prevalent entities among the haemodialysis population (12). But did not differ significantly between the CKD stages (13) Predominance of anxitey has been observed to be 21.1%-53.4% in hemodialysis and pre-dialysis CKD patients (14) Some studies reported females have a higher risk of depression among patients with renal disease (15) . Hemodialysis patients are known to face numerous psychosocial stressors (16) . These include physical symptoms, specific dietary

regimens, time constraints and changes in their body image. Therefore, psychological and social problems are common in such population and a regular combined nephrology/psychiatry approach should be central to the medical care of hemodialysis patients in order to accurately assess for depression among them (17) (18) . Inflammatory markers such as TNF, CRP, and IL-6, are consistent predictors of mortality in ESRD as part of routine ESRD monitoring (19) . Depressive symptoms and elevated inflammatory cytokine levels coexist in CKD and ESRD patients, but association between of them is uncertain (20) . Prevalence of depression is high among CKD patients , but there was no difference in the intensity of hopelessness, suicide ideation and depression symptoms between stable hemodialysis and transplant patients (21) . However , decreased eGFR is significantly associated with depression and suicidal ideation among these patients (22) . Patients with ESRD have a higher frequency of depression compared to pre-dialysis CKD patients (23) . Other factors associated with depression and suicidal indentation are older age, female sex, comorbidities including HTN , DM , hepatitis C and disturbed liver function have strong correlation with psychological parameters (22) (24).

Statistical analysis method

The data were analyzed using Statistical Packages for Social Sciences (SPSS) version 21.A p-value cut off point of 0.05 at 95% CI used to determine statistical significance. Numbers and percentages were used to presents all categorical variables while mean \pm standard deviation were used to summarize all continuous variables. We used Quick Inventory of Depressive Symptomatology (QIDS SR-16) to measure the depression of hemodialysis patients. (29) The QIDS-SR total scores range from 0 to 27 where 0-5 not severe, 6-10 mild, 11-15 moderate, 16-20 severe, 21-27 very severe. The analyses measure the association between socio-demographic characteristics and depression level among hemodialysis patients by using chi-square test.

Table 1: Socio demographic data of hemodialysis patients

Study Variables	N (%) (n=399)
Age group in Years	
• ≤30	51 (12.8%)
• 31 – 40	74 (18.5%)
• 41 – 50	72 (18.0%)
• 51 – 60	97 (24.3%)
• >60	105 (26.3%)
Gender	
• Male	210 (52.6%)
• Female	189 (47.4%)
Marital Status	
• Single	89 (22.3%)
• Married	254 (63.7%)
• Divorced or Widowed	56 (14.0%)

There were 399 patients who were voluntarily involved in this study. Age range of the patients were from 13 to 84 years old where 51 (12.8%) of the patients were from 30 years or less age group, 74 (18.5%) were from 31 – 40 years' age group, 72 (18.0%) were from 41 – 50 years' age group, 97 (24.3%) were from 51 – 60 years' age group and 105 (26.3%) were in more than 60 years' age group. Majority of them were males as 210 (52.6%) while 189 (47.4%) were females. More than sixty percent of them were married, 22.3% were single and 14.0% were either divorced or widowed (**Table 1**).

Table 2: Characteristics of hemodialysis patients with depression

Characteristics	N (%) (n=399)
Sleep onset insomnia	
• Never takes longer than 30 minutes to fall asleep.	193 (48.4%)
• Takes at least 30 minutes to fall asleep, less than half the time.	78 (19.5%)
• Takes at least 30 minutes to fall asleep, more than half the time.	42 (10.5%)
• Takes more than 60 minutes to fall asleep, more than half the time.	86 (21.6%)
Mid-nocturnal insomnia	
• Does not wake up at night.	123 (30.8%)
• Restless, light sleep with few awakenings.	50 (12.5%)
• Wakes up at least once a night, but goes back to sleep easily.	66 (16.5%)
• Awakens more than once a night and stays awake for 20 minutes or more, more than half the time.	160 (40.1%)
Early-morning insomnia	
• Less than half the time, awakens no more than 30 minutes before necessary.	299 (74.9%)
• More than half the time, awakens more than 30 minutes before need be	54 (13.5%)
• Awakens at least 1 hour before need be, more than half the time.	30 (07.5%)
• Awakens at least 2 hours before need be, more than half the time.	16 (04.0%)
Hypersomnia	
• Sleeps no longer than 7–8 hours/night, without naps.	157 (39.3%)
• Sleeps no longer than 10 hours in a 24-hour period (including naps).	216 (54.1%)
• Sleeps no longer than 12 hours in a 24-hour period (including naps).	24 (06.0%)
• Sleeps longer than 12 hours in a 24-hour period (including naps).	02 (0.5%)
Mood (sadness)	

• Does not feel sad.	220 (55.1%)
• Feels sad less than half the time.	118 (29.6%)
• Feels sad more than half the time.	47 (11.8%)
• Feels intensely sad virtually all the time.	14 (03.5%)
Appetite (decreased)	
• No change from usual appetite.	254 (63.7%)
• Eats somewhat less often and/or lesser amounts than usual.	92 (23.1%)
• Eats much less than usual and only with personal effort.	49 (12.3%)
• Eats rarely within a 24-hour period, and only with extreme personal effort or with persuasion by others.	04 (01.0%)
Appetite (increased)	
• No change from usual appetite.	260 (65.2%)
• More frequently feels a need to eat than usual.	38 (09.5%)
• Regularly eats more often and/or greater amounts than usual.	02 (0.5%)
• Feels driven to overeat at and between meals.	01 (0.3%)
Weight (decrease)	
• Has experienced no weight change.	260 (65.2%)
• Feels as if some slight weight loss occurred.	53 (13.3%)
• Has lost 2 pounds or more.	37 (09.3%)
• Has lost 5 pounds or more.	49 (12.3%)

Table 3: Characteristics of hemodialysis patients with depression (Cont'd.)

Characteristics	N (%) (n=399)
Weight (increase)	
• Has experienced no weight change.	329 (82.5%)
• Feels as if some slight weight gain has occurred.	30 (07.5%)
• Has gained 2 pounds or more.	22 (05.5%)
• Has gained 5 pounds or more.	18 (04.5%)
Concentration/decision making	
• No change in usual capacity to concentrate and decide.	282 (70.7%)
• Occasionally feels indecisive or notes that attention often wanders.	64 (16.0%)
• Most of the time struggles to focus attention or make decisions.	41 (10.3%)
• Cannot concentrate well enough to read or cannot make even minor decisions.	12 (03.0%)
Outlook (self)	
• Sees self as equally worthwhile and deserving as others.	295 (73.9%)
• Is more self-blaming than usual.	86 (21.6%)
• Largely believes that he/she causes problems for others.	15 (03.8%)
• Ruminates over major and minor defects in self.	03 (0.80%)
Suicidal ideation	
• Does not think of suicide or death.	310 (77.7%)
• Feels life is empty or is not worth living.	61 (15.3%)
• Thinks of suicide/death several times a week for several minutes.	26 (06.5%)
• Thinks of suicide/death several times a day in depth, or has made specific plans for or attempted suicide.	02 (0.5%)
Involvement	
• No change from usual level of interest in other people and activities.	234 (58.6%)
• Notices a reduction in former interests/activities.	99 (24.8%)

- Finds only 1 or 2 former interests remain. 49 (12.3%)
- Has virtually no interest in formerly pursued activities. 17 (04.3%)

Energy/fatigability

- No change in usual level of energy. 148 (37.21%)
- Tires more easily than usual. 202 (50.6%)
- Makes significant personal effort to initiate or maintain usual daily activities. 26 (06.5%)
- Unable to carry out most of usual daily activities due to lack of energy. 23 (05.8%)

Psychomotor slowing

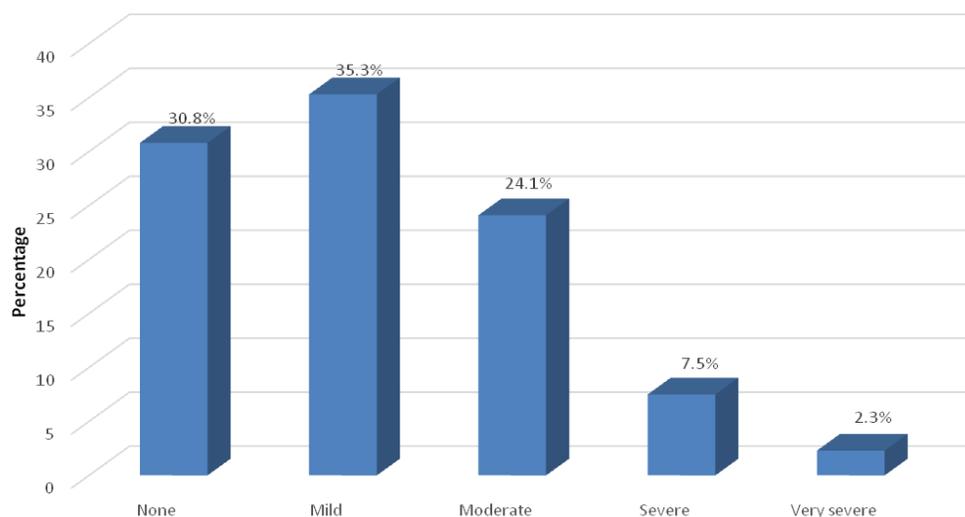
- Normal speed of thinking, gesturing, and speaking. 338 (84.7%)
- Patient notes slowed thinking, and voice modulation is reduced. 48 (12.0%)
- Takes several seconds to respond to most questions; reports slowed thinking. 09 (02.3%)
- Is largely unresponsive to most questions without strong encouragement. 04 (01.0%)

Psychomotor agitation

- No increased speed or disorganization in thinking or gesturing. 349 (87.5%)
- Fidgets, wrings hands and shifts positions often. 45 (11.3%)
- Describes impulse to move about and displays motor restlessness. 04 (01.0%)
- Unable to stay seated; paces about with or without permission. 01 (0.30%)

Table 4: Level of depression among hemodialysis patients

Factor	N (%)
Depression total score (Mean \pm SD)	8.8 \pm 5.1
Level of depression	
• None	123 (30.8%)
• Mild	141 (35.3%)
• Moderate	96 (24.1%)
• Severe	30 (7.5%)
• Very severe	09 (02.3%)

Figure 1: Distribution of level of depression among hemodialysis patients

The level of depression among hemodialysis patients has been elaborated at **table 3**. Based on the depression total score, the mean score was 08.8 (SD 5.1). This has been classified into 5 categories such as No depression (30.8%), Mild depression (35.3%), moderate depression (24.1%), Severe depression (7.5%) and very severe with 2.3% (**Figure 1**)

Figure 2: Prevalence of depression among hemodialysis patients

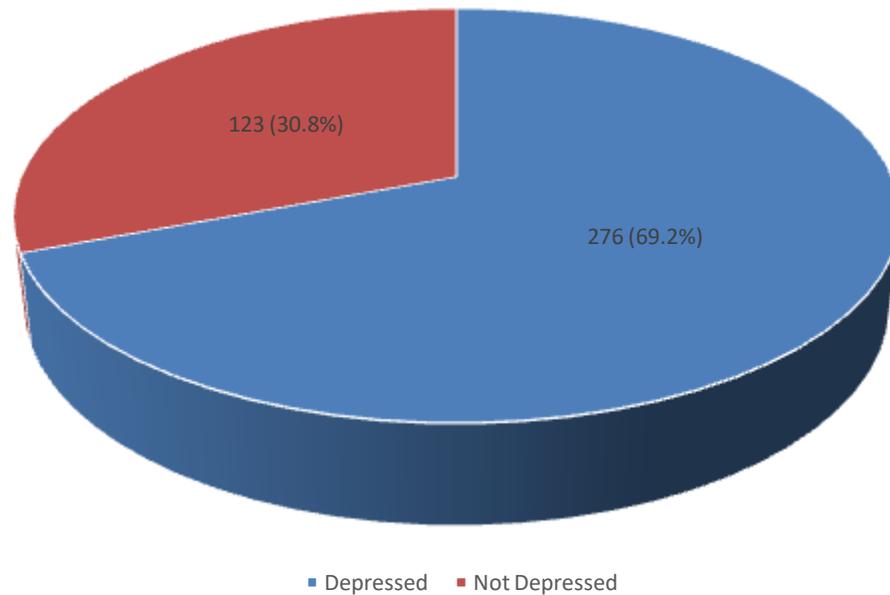


Figure 2 shows the prevalence of depression among hemodialytic patients. It was revealed that 276 (69.2%) of the patients were depressed while 123 (30.8%) were not depressed.

Table 5: Relationship between socio demographic characteristics and depression level indicators of hemodialysis patients (n=399)

Study Variables	None N (%) n=123	Mild N (%) n=141	Moderate N (%) n=96	Severe N (%) n=30	Very Severe N (%) n=09	P-value [§]
Age group in years						
• <30	22 (17.9%)	17 (12.1%)	08 (8.3%)	04 (13.3%)	0	0.013**
• 31 – 40	31 (25.2%)	22 (15.6%)	12 (12.5%)	09 (30.0%)	0	
• 41 – 50	19 (15.4%)	27 (19.1%)	22 (22.9%)	03 (10.0%)	01 (11.1%)	
• 51 – 60	32 (26.0%)	35 (24.8%)	23 (32.3%)	03 (10.0%)	04 (44.4%)	
• >60	19 (15.4%)	40 (28.4%)	31 (32.3%)	11 (36.7%)	05 (44.4%)	
Gender						
• Male	77 (62.6%)	68 (48.2%)	53 (55.2%)	11 (36.7%)	01 (11.1%)	0.004**
• Female	46 (37.4%)	73 (51.8%)	43 (44.8%)	19 (63.3%)	08 (88.9%)	
Marital Status						
• Single	36 (29.3%)	30 (21.3%)	15 (15.6%)	08 (26.7%)	0	0.004**
• Married	82 (66.7%)	89 (63.1%)	61 (63.5%)	15 (50.0%)	07 (77.8%)	
• Divorced/Widowed	05 (04.1%)	22 (15.6%)	20 (20.8%)	07 (23.3%)	02 (22.2%)	

[§] **P-value** has been calculated using chi square test. ** Significant at $p \leq 0.05$ level.

We used chi square test at table 3 to measure the relationship between levels of depression among the socio demographic characteristics of participants with p-values which indicates whether the relationship is statistically significant where $p \leq 0.05$ has been used the significant level for all statistical tests. There was significant relationship between age group and years and the level of depression ($p=0.013$) where age group of 51 – 60 years old was higher on no depression while age group of more than 60 years old was higher on the rest of the level of depression. Gender also shows significant difference on the level of depression ($p=0.004$) where males were dominant on None, mild and moderate depression while females was higher for both severe and very severe. Marital status also shows positive relationship ($p=0.004$) with married was superior in all the level of depression.

DISCUSSION:

Depression is more common on patients with chronic kidney disease (CKD) and among those patients in dialysis. This has been attributed with higher rates of hospitalization and death. (30) The main objective of this study is to evaluate prevalence rate of depression among hemodialytic patients in Almadinah. Based on our findings, 69.2% of the patients were having depression while 30.8 have no depression. This finding is consistent form the article published by Hawamdeh et al. (3) Where they reported 70% of their study patients with kidney failure found to have depression. This is contrary to the paper published by Al Zaben and associates where they elaborated a relatively less prevalence with 03.2% with depressive disorder (DD). (6) Moreover, our report was consistent from regional and international studies. (18) (23) (24) (31) Although in Korea and US, depression of hemodialytic patients had shown relatively less prevalence as 25.3% and 28% respectively. (16) (32) Nonetheless our findings indicated that the risk of depression was relatively high on hemodialytic patients.

Furthermore, this paper found significant relationship among age group in years, gender and marital status against the level of depression. We also further observed in this study, that those married women with above 60 years of age are more likely to have depressive symptoms although further investigation are needed to attest this observation due to variable limitation. In the article conducted by Hawamdeh and her colleagues, when comparing the socio demographic data along with the level of depression, they found significant results on marital status and socioeconomic level. (3) Several published articles found no relationship between socio demographic

data of participants and the level of depression. (6) (18) (24) Al Zaben et al when they compared the demographic data among depressed and not depressed patients, they had failed to prove their relationship although they proceeded by mental health against the level of depression to which they found significant association. (6) However in Egypt, researchers found negative relationship on all sociodemographic variables against the level of depression, this might be attributed to the number of sample size they had in their study to which it was relatively small population. (18) In South Korea, they found gender has significant association with the level of depression. (16) While in Pakistan, majority of the socio demographic data were statistically significant. (24) While different published articles exhibited significant results when comparing the level of depression against socio demographic characteristics of hemodialytic patients, our findings were substantial enough to support various published articles in the same context. Although the demographic data in our study was limited into three variables, still we found significant results among those three predictors which generally signify its substantiality.

CONCLUSION:

In this study two out three hemodialytic patients were depressed. This prevalence of depression was still at high and this causes more hospitalization and increased of mortality rates among patients. In this regard, extra counseling and monitoring are needed for those patients. Preemptive measures are necessary for those hemodialytic participants with suspected depressive symptoms. Medical practitioner plays a vital role in improving the mental state of hemodialytic patients with depression.

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REFERENCES:

1. Lysaght MJ. Maintenance Dialysis Population Dynamics: Current Trends and Long-Term Implications.
2. Hassanien AA, Al-Shaikh F, Vamos EP, Yadegarfar G, Majeed A. Epidemiology of end-stage renal disease in the countries of the Gulf Cooperation Council: a systematic review. *JRSM Short Rep.* 2012;3(6):1–21.

3. Mohammed A. Determinants and prevalence of depression in patients with chronic renal disease , and their caregivers. 2017;183–9.
4. Journal S, Donation O. SCOT Data. 2012;23(5):1118–22.
5. Journal S. of Kidney Diseases and Transplantation SCOT Data Dialysis in the Kingdom of Saudi Arabia. 2014;25(4):918–26.
6. Zaben F Al, Khalifa DA, Sehlo MG, Shohaib S Al, Shaheen F, Alhozali H, et al. Depression in patients with chronic kidney disease on dialysis in Saudi Arabia. *Int Urol Nephrol*. 2014;46(12):2393–402.
7. Al Zaben F, Khalifa DA, Sehlo MG, Al Shohaib S, Binzaqr SA, Badreg AM, et al. Religious Involvement and Health in Dialysis Patients in Saudi Arabia. *J Relig Health*. 2014;54(2):713–30.
8. Kimmel PL. Psychosocial factors in dialysis patients. 2001;59:1599–613.
9. Kimmel PL. Depression in patients with chronic renal disease What we know and what we need to know. 2002;53:951–6.
10. Kimmel PL, Peterson RA. Depression in Patients with End-Stage Renal Disease Treated with Dialysis: Has the Time to Treat Arrived? 2006;349–52.
11. Bautovich A, Katz I, Smith M, Loo CK, Harvey SB. Depression and chronic kidney disease: A review for clinicians. *Aust N Z J Psychiatry*. 2014;48(6):530–41.
12. Pak A, Tanvir S, Butt G-U-D, Taj R. Prevalence of Depression and Anxiety in Chronic Kidney Disease Patients on Haemodialysis Sohail Tanvir et al Prevalence of Depression and Anxiety in Chronic Kidney Disease Patients on Haemodialysis Keywords: Depression and Uremia, Anxiety and Chronic Rena. *Inst Med Sci*. 2013;9(2):64–7.
13. Lee YJ, Kim MS, Cho S, Kim SR. Association of depression and anxiety with reduced quality of life in patients with predialysis chronic kidney disease. *Int J Clin Pract*. 2013;
14. Cantekin I, Curcani M, Tan M. Determining the anxiety and depression levels of pre-dialysis patients in eastern Turkey. *Ren Fail*. 2014;
15. Marcus SM, Young EA, Kerber KB, Kornstein S, Farabaugh AH, Mitchell J, et al. Gender differences in depression: Findings from the STAR * D study B. 2005;87:141–50.
16. Son Y-J, Choi K-S, Park Y-R, Bae J-S, Lee J-B. Depression, Symptoms and the Quality of Life in Patients on Hemodialysis for End-Stage Renal Disease. *Am J Nephrol*. 2009;29(1):36–42.
17. Ginieri-Coccosis M, Theofilou P, Synodinou C, Tomaras V, Soldatos C. Quality of life, mental health and health beliefs in haemodialysis and peritoneal dialysis patients: Investigating differences in early and later years of current treatment. *BMC Nephrol*. 2008;9(1):1–9.
18. Donia AF, Zaki NF, Elassy M, Elbahaey W. Study of depression and quality of life among hemodialysis patients: an Egyptian experience. *Int Urol Nephrol*. 2015;47(11):1855–62.
19. Desai AA, Nissenson A, Chertow GM, Farid M, Singh I, van Oijen MGH, et al. The relationship between laboratory-based outcome measures and mortality in end-stage renal disease: A systematic review. *Hemodial Int*. 2009;13(3):347–59.
20. Taraz M, Taraz S, Dashti-Khavidaki S. Association between depression and inflammatory/anti-inflammatory cytokines in chronic kidney disease and end-stage renal disease patients: A review of literature. *Hemodial Int*. 2015;19(1):11–22.
21. Andrade SV, Sesso R, Diniz DH de MP. Hopelessness, suicide ideation, and depression in chronic kidney disease patients on hemodialysis or transplant recipients. *J Bras Nefrol*. 2015;37(1):55–63.
22. Jhee JH, Lee E, Cha M-U, Lee M, Kim H, Park S, et al. Prevalence of depression and suicidal ideation increases proportionally with renal function decline, beginning from early stages of chronic kidney disease. *Med*. 2017;96(44):e8476–e8476.
23. Shafi ST, Shafi T. A comparison of anxiety and depression between pre-dialysis chronic kidney disease patients and hemodialysis patients using hospital anxiety and depression scale. 2017;33(4):4–8.
24. Anees M, Barki H, Masood M, Ibrahim M, Mumtaz A. Depression in hemodialysis patients. *Pakistan J Med Sci*. 2008;24(4):560–5.
25. Chapter 1: Definition and classification of CKD. *Kidney Int Suppl*. 2013;3(10):19–6264.
26. Zaben F Al, Khalifa DA, Sehlo MG, Shohaib S Al, Shaheen F, Alhozali H, et al. Depression in patients with chronic kidney disease on dialysis in Saudi Arabia. *Int Urol Nephrol*. 2014;
27. Andreasen NC. BOOK FORUM. *Am J Psychiatry*. 1981;381.
28. BKelleri AJHtMiJcNkCmTnEtHk. 24. scineceDirect [Internet]. Available from: <https://www.sciencedirect.com/science/article/pii/S0006322302018668>
29. Qids S, Qids-c CR, Rush a J, Trivedi MH, Ibrahim HM, Carmody TJ, et al. The 16-Item Quick Inventory of Depressive. *Depression*. 2003;54(5):573–83.

30. Unruh M. Chronic Kidney Disease: Depression in Chronic Kidney Disease [internet]. Decision Support in Medicine. 2017. Accessed at <https://www.renalandurologynews.com/nephrology-hypertension/chronic-kidney-disease-depression-in-chronic-kidney-disease/article/616028/>
31. Hedayati SS, Minhajuddin AT, Afshar M, Toto RD, Trivedi MH, Rush AJ. Association between major depressive episodes in patients with chronic kidney disease and initiation of dialysis, hospitalization, or death. *JAMA*. 2010 May 19;303(19):1946-53. doi: 10.1001/jama.2010.619.
32. Drayer RA, Piraino B, Reynolds CF 3rd, Houck PR, Mazumdar S, Bernardini J, Shear MK, Rollman BL. Characteristics of depression in hemodialysis patients: symptoms, quality of life and mortality risk. *Gen Hosp Psychiatry*. 2006 Jul-Aug;28(4):306-12.