

Exploring Pruritus in Patients with Chronic Kidney Disease in Relation to Sociodemographic Characteristics and Hemodialysis

Blatzoni Lambrini¹, Boukouvalas Matthaïos², Zafiriou Efterpi³

1. RN, University General Hospital of Larissa, MSc¹, MSc(c)², PhD(c)

2. RN, General Hospital of Larissa, MSc¹, MSc

3. Associate Professor of Dermatology, University of Thessaly

ABSTRACT

Introduction: Pruritus is a common symptom that significantly affects the quality of life of patients with Chronic Kidney Disease (CKD). According to the international literature, approximately 40% of patients with end-stage renal disease are affected by pruritus.

Aim: To explore the association between pruritus in patients with CKD, their sociodemographic characteristics, and hemodialysis treatment.

Methodology: A cross-sectional study was conducted using self-report questionnaires. The questionnaire included two sections: sociodemographic characteristics and assessment of pruritus. Data analysis was performed using SPSS version 23.

Results: Of all the variables examined (sex, marital status, educational level, place of residence, having children, net monthly income, hemodialysis, and the presence of diabetes mellitus), only hemodialysis was significantly associated with pruritus levels ($p=0.003$). Specifically, patients undergoing hemodialysis had higher pruritus levels than patients non undergoing hemodialysis.

Conclusions: The study demonstrated a significant association between hemodialysis and pruritus levels in patients with CKD. This finding indicates the need for targeted management of pruritus in hemodialysis patients.

Keywords: hemodialysis, patients, pruritus, Chronic Kidney Disease

Corresponding Author:

Blatzoni Lambrini

email: labriniblatzoni@gmail.com

Submitted date: 11/02/2025

Accepted date: 29/07/2025

INTRODUCTION

Pruritus associated with Chronic Kidney Disease (CKD) is a common and burdensome symptom for patients with end-stage renal disease, significantly affecting their quality of life. The pathogenesis of pruritus in CKD remains unclear (Mettang, 2015). According to epidemiological data, approximately 40% of patients with end-stage renal disease experience pruritus, with prevalence estimates varying depending on the diagnostic tools used (Świerczyńska, 2021; Satti, 2019). The pathophysiology of pruritus in CKD is complex, with uremia recognized as the most important systemic disorder. Several mechanisms have been proposed, including secondary hyperparathyroidism, divalent ion disturbances, histamine, allergic sensitization, iron-deficiency anemia, proliferation of cutaneous histiocytes, and neurological disorders (Hatano, 2013).

The impact of pruritus on patients with CKD is multidimensional, affecting quality of life, sleep, and emotional status (Shirazian, 2017). Assessing the severity of pruritus is challenging, as no measurement methods are universally accepted. Available instruments include severity scales, multidimensional assessment scales, and scales evaluating the impact on quality of life, such as the Dermatology Life Quality Index (DLQI) and the Skindex (Verduzco, 2020; Fishbane, 2020). Recent studies have identified significant associations between pruritus severity and various factors. Specifically, the study by Hasan et al. in 53 patients with CKD found significant associations between pruritus severity and factors such as sex, the area affected by pruritus, and sleep quality (Hasan, 2021). However, therapeutic approaches often produce conflicting results, which has been attributed to study limitations (Poku et al., 2022).

The aim of the present study was to investigate the relationship between pruritus, the sociodemographic characteristics of patients with CKD, and hemodialysis treatment. More specifically, the study examines the effect of hemodialysis on pruritus levels and its association with patients' quality of life. The findings are expected to contribute to a better understanding of the phenomenon and to improved management of pruritus in patients with CKD.

METHODOLOGY

Study Design

This was a cross-sectional observational study conducted in the public hospitals of the Larissa Regional Unit. The research design involved the collection of primary quantitative data through a self-report questionnaire. The questionnaire consisted of three distinct sections: (a) patients' sociodemographic characteristics; (b) the Scoring Atopic Dermatitis (SCORAD)/Numerical Rating Scale

(NRS)/sleep disturbance scales for the assessment of pruritus; and (c) the Dermatology Life Quality Index (DLQI) for assessing quality of life in relation to dermatological status. Data was collected during patients' scheduled visits to the hemodialysis units and outpatient nephrology clinics of the participating hospitals.

Study Sample

The target population of the study consisted of patients with CKD who were being followed up at the public hospitals of the Larissa Regional Unit (the General Hospital of Larissa "Koutlimpaneio and Triantafylleio" and the University Hospital of Larissa). Convenience sampling was applied, with a total sample of 111 patients.

The inclusion criteria were: (a) diagnosis of CKD; (b) age over 18 years; (c) ability to understand the Greek language; and (d) consent to participate in the study. The exclusion criteria were: (a) the presence of rashes and pruritus not associated with CKD but attributable to another disease; (b) severe psychiatric illness affecting the ability to participate; and (c) unwillingness to participate in the study. The sample size was calculated based on the expected rate of pruritus in patients with CKD (40% according to the literature), with a 95% confidence level and a 5% margin of error.

Data Collection

A self-report questionnaire with three sections was used. The first section concerned patients' sociodemographic characteristics. The second section included the Scoring Atopic Dermatitis (SCORAD) and Numerical Rating Scale (NRS) for the assessment of pruritus, as well as questions on sleep disturbances. The third section included the Dermatology Life Quality Index (DLQI) for assessing quality of life in relation to dermatological status; this instrument has been validated in the Greek population. Questionnaires were completed during patients' scheduled visits to the hemodialysis units and outpatient nephrology clinics from April to September 2023. Completion of the questionnaire took approximately 15-20 minutes and was carried out in the presence of the researcher, who provided clarifications when needed.

Ethical Considerations

The study was approved by the Scientific Committees and the Boards of Directors of the General Hospital of Larissa "Koutlimpaneio and Triantafylleio" and the University Hospital of Larissa. The research was conducted in accordance with the principles of the Declaration of Helsinki, and the basic principles of research ethics and scientific conduct were observed. More specifically, all participants were informed in writing and orally about the purpose and procedure of the study, as well as about the safeguarding of anonymity and the confidentiality

of the data collected for the research. Participation was voluntary, and all participants signed an informed consent form. They also retained the right to withdraw from the study at any time without having to provide a specific reason and without any impact on their health care. The data were coded and stored on a computer to which only the principal investigator of the study had the password.

Statistical analysis

Statistical analysis of the data was performed using SPSS version 23.0. Descriptive statistical analysis was first applied, followed by inferential statistical analysis. Quantitative variables were described using means and standard deviations, whereas categorical variables were described using frequencies, mean values, standard deviations, and percentages. The normality of the quantitative variables derived from the questions of the main study instrument was assessed with the Kolmogorov-Smirnov test. Associations between variables were examined using Pearson's correlation coefficient for normally distributed variables and Spearman's coefficient for non-normally distributed variables. For comparisons of mean values between two independent groups, the independent-samples t-test or the non-parametric Mann-

Whitney U test was used, depending on the normality of the distribution of the relevant variable. For comparisons among more than two groups, one-way analysis of variance (one-way ANOVA) or the non-parametric Kruskal-Wallis test was used. The level of statistical significance for all statistical analyses in the study was set at $p < 0.05$.

RESULTS

Of the 125 patients approaching, 111 participated in the study, yielding a response rate of 88.8%. The demographic and clinical characteristics of the participants are presented in Table 1. The study sample consisted of 111 patients with CKD, of whom 77% ($n=85$) were men. The mean age of the participants was 52 ± 6 years, with 87% ($n=97$) being over 45 years of age. Regarding marital status, the majority of patients were married and had children. Of all patients, 55.8% ($n=62$) were undergoing hemodialysis, while 35.1% ($n=39$) were diagnosed with diabetes mellitus (Figure 1). In addition, the age group most frequently undergoing hemodialysis was 40-59 years (28 patients), followed by 60-79 years (22 patients), 20-39 years (5 patients), and finally patients aged 80 years and above (4 patients) (Figure 2).

Regarding pruritus levels (Table 2), patients generally

Figure 1. Percentage of patients with CKD undergoing hemodialysis as a proportion of all participants.

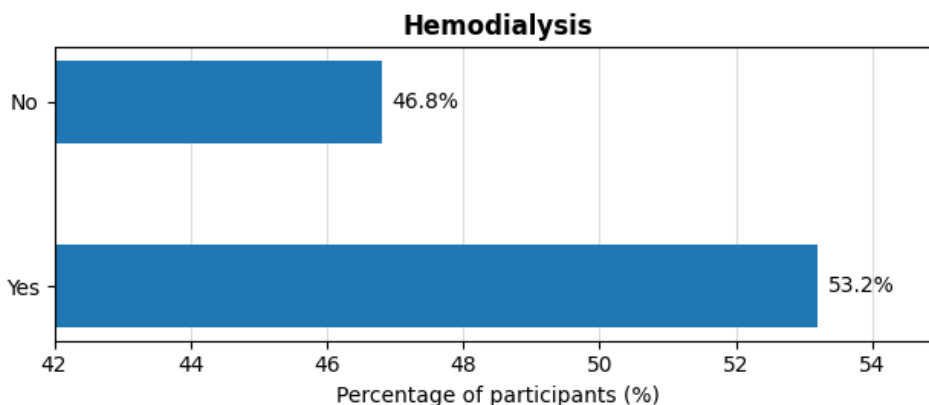
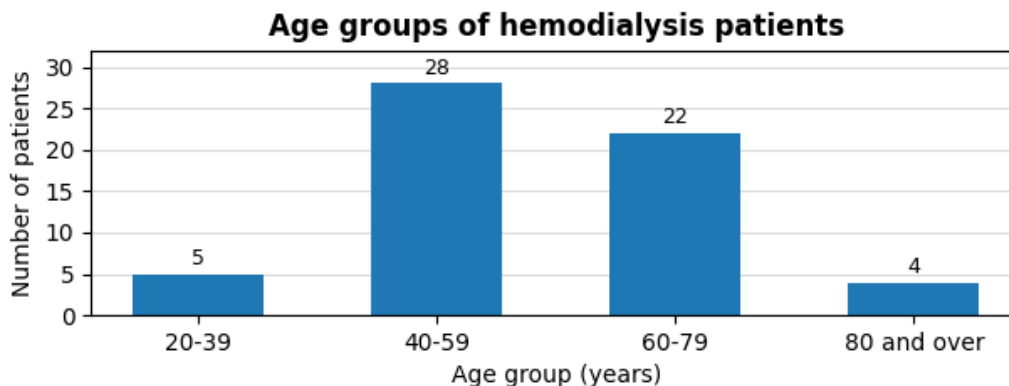


Figure 2. Age groups of hemodialysis patients. The horizontal axis shows patient age groups, and the vertical axis shows the number of patients.



reported low levels, with a mean value of 2.25 ± 2.79 for the 24-hour period and 2.84 ± 3.41 for the 72-hour period (0-10 scale). A total of 51.4% of patients reported the onset

of pruritus after the diagnosis of CKD, with the majority (39.6%) reporting a very small increase in intensity.

Table 1. Demographic and clinical characteristics of participants (N=111)

Characteristics	n (%) or M $\pm$ SD
Age (years)	59.81 $\pm$ 14.71
Sex	
Men	55 (49.5)
Women	56 (50.5)
Marital status	
Married	77 (69.4)
Single	19 (17.1)
Widowed	13 (11.7)
Divorced	2 (1.8)
Educational level	
Illiterate	12 (10.8)
Primary education	37 (33.3)
Secondary education	41 (36.9)
Higher education / TEI / IEK	21 (18.9)
Clinical characteristics	
Hemodialysis	59 (53.2)
Diabetes mellitus	39 (64.9%)

Table 2. Pruritus characteristics in the total sample

Variables	M $\pm$ SD or n (%)
24-hour pruritus (0-10)	2.25 $\pm$ 2.79
72-hour pruritus (0-10)	2.84 $\pm$ 3.41
Sleep disturbances (0-10)	2.46 $\pm$ 3.10
Onset after CKD diagnosis	
Yes	57 (51.4)
No	54 (48.6)
Increase in intensity after diagnosis	
Very little	44 (39.6)
Little	19 (17.1)
Moderate	24 (21.6)
Much	6 (5.4)
Very much	11 (9.9)

The investigation of associations between demographic characteristics and pruritus levels is presented in Table 3. Of all the variables examined, only hemodialysis was found to be significantly associated with pruritus levels ($p=0.003$). Specifically, patients undergoing hemodialysis had higher pruritus levels (median=3.0) than patients not undergoing hemodialysis (median=0.0) (Table 4). In the age analysis,

the reported coefficient did not indicate a statistically significant association between age and pruritus levels ($\rho=-0.057$, $p=0.554$). The remaining demographic variables also showed no statistically significant effect on pruritus levels, although having children showed a borderline association ($p=0.051$).

Table 3. Associations between demographic characteristics and pruritus levels

Variables	Statistical test	p-value
Age	rho=-0.057	0.554
Sex	U=1449.5	0.582
Marital status	H=6.419	0.093
Educational level	H=3.931	0.269
Place of residence	U=1367.5	0.467
Having children	U=723.5	0.051
Monthly income	H=1.471	0.689
Hemodialysis	U=1038.5	0.003*
Diabetes mellitus	U=1199.0	0.192

***Statistically significant difference (p<0.05)**

Table 4. Pruritus levels by treatment group

Group	Median pruritus value	IQR
With hemodialysis	3.0	4.5
Without hemodialysis	0.0	2.0

The stratified analysis (Table 5) showed significant differences in pruritus patterns between hemodialysis and non-hemodialysis patients in relation to sociodemographic characteristics. Regarding educational level, a consistent trend toward higher pruritus levels was observed among patients with lower education, with illiterate patients showing the highest levels ($M=2.83\pm3.42$) and graduates of higher education showing the lowest levels ($M=1.95\pm2.31$). This pattern was more evident among hemodialysis patients, where variation was greater (from 2.67 to 4.20)

than among non-hemodialysis patients (from 0.85 to 1.57). With regard to marital status, divorced and widowed patients had higher pruritus levels than married and unmarried patients, and this trend was more pronounced in the hemodialysis group. In particular, having children appeared to have a protective role, as patients with children had lower pruritus levels ($M=2.12\pm2.65$) than those without children ($M=2.69\pm3.21$), although this difference was borderline non-significant ($p=0.051$).

Table 5. Pruritus levels by sociodemographic characteristics and treatment group

Characteristic	Total sample n, M $\pm$ SD	With hemodialysis n, M $\pm$ SD	Without hemodialysis n, M $\pm$ SD	p-value
EDUCATIONAL LEVEL				0.269
Illiterate	12, 2.83 $\pm$ 3.42	5, 4.20 $\pm$ 3.89	7, 1.57 $\pm$ 2.64	
Primary education	37, 2.41 $\pm$ 2.95	20, 3.45 $\pm$ 3.21	17, 1.18 $\pm$ 1.74	
Secondary education	41, 2.15 $\pm$ 2.74	23, 2.89 $\pm$ 2.86	18, 1.22 $\pm$ 2.01	
Higher education / TEI / IEK	21, 1.95 $\pm$ 2.31	11, 2.67 $\pm$ 2.51	10, 0.85 $\pm$ 1.52	
MARITAL STATUS				0.093
Unmarried	19, 1.63 $\pm$ 2.09	8, 2.50 $\pm$ 2.33	11, 0.91 $\pm$ 1.64	
Married	77, 2.27 $\pm$ 2.73	42, 3.12 $\pm$ 3.24	35, 1.23 $\pm$ 1.48	
Widowed	13, 3.08 $\pm$ 3.45	8, 4.25 $\pm$ 3.89	5, 1.40 $\pm$ 2.07	
Divorced	2, 4.50 $\pm$ 4.95	1, 6.00*	1, 3.00*	
CHILDREN				0.051
Yes	85, 2.12 $\pm$ 2.65	48, 2.96 $\pm$ 3.15	37, 1.08 $\pm$ 1.52	
No	26, 2.69 $\pm$ 3.21	11, 3.82 $\pm$ 3.67	15, 1.80 $\pm$ 2.41	

Note: The p-values refer to comparisons between the categories of each characteristic in the total sample (Kruskal-Wallis H test for educational level and marital status; Mann-Whitney U test for having children).

DISCUSSION

The main finding of the present study is the significant association between hemodialysis and pruritus levels in patients with CKD. Specifically, hemodialysis patients reported higher pruritus levels and more quality-of-life problems, particularly in the domains of daily activities, interpersonal relationships, and sleep. This finding is supported by the study by Xie et al. (2022), who also found that pruritus significantly worsens the quality of life of hemodialysis patients. In contrast to previous studies (Xie, 2022), no association between age and pruritus was found in the sample of the present study. This finding is consistent with the results of Adejumo et al. (2016), who also found no association between demographic characteristics and pruritus intensity. This difference is likely due to the different characteristics of the populations studied (Adejumo, 2016). Regarding sociodemographic factors, the present study did not identify statistically significant associations between educational level, marital status, and pruritus levels, despite the observed trend toward higher pruritus levels in patients with lower educational attainment. This finding is consistent with the study by Adejumo et al. (2016), who likewise found no statistically significant association between demographic characteristics and pruritus intensity. The absence of statistical significance is likely attributable to the relatively small sample size ($n=111$) and the dominant role of hemodialysis as a factor. The borderline finding regarding having children ($p=0.051$) is of particular interest, suggesting a possible protective role. Having children may provide enhanced psychosocial support, reduce stress, and encourage better self-care (Kiliś-Pstrusińska et al., 2013; Kisomi et al., 2024). Similarly, the higher tendency toward pruritus among widowed and divorced patients may reflect a lack of social support. Future studies with larger samples could further investigate the interaction between psychosocial factors and pruritus in CKD. The effect of marital status and having children on sleep problems is also of particular interest, as this finding adds new knowledge to the existing literature. In addition, the present study confirmed the strong positive association between pruritus levels and reduced quality of life, as previously reported in earlier studies (Granados, 2016; Rehman, 2018).

A key limitation of the study is that it was conducted in two hospitals within a specific geographic region, which limits the generalizability of the findings. On the other hand, both the high response rate and the agreement of the findings with the international literature strengthen the reliability of the results. The study findings indicate the need for targeted interventions for hemodialysis patients with pruritus. Specifically, the design of an individualized intervention leaflet tailored to the needs of patients in the hemodialysis unit is recommended, as also suggested by Ezzat et al. (2021) (Ezzat, 2021).

The findings of the present study indicate the need to systematically incorporate the assessment and management of pruritus into nursing care for hemodialysis patients. Specifically, the adoption of a

standardized assessment protocol is recommended, including: (a) systematic recording of pruritus intensity at each hemodialysis session using the NRS scale (0-10); (b) weekly assessment of the impact of pruritus on sleep and daily activities; and (c) monthly assessment of quality of life using the DLQI scale (Vernon et al., 2021; Altınok & Akyar, 2019). In addition, it is necessary to develop an educational program for nursing staff in hemodialysis units. This program should include the pathophysiology of pruritus in CKD; techniques for early recognition and assessment of symptoms; pharmacological and non-pharmacological interventions (such as adjustment of hemodialysis parameters, use of appropriate moisturizing products, and relaxation techniques); and psychosocial support skills for patients with chronic pruritus (Alkhafaji & Al-Mayahi, 2023). Regarding patient interventions, the creation of individualized educational material (printed leaflets and audiovisual material) is recommended, providing practical guidance on daily skin care, recognition of factors that exacerbate pruritus (e.g., hot water, certain fabrics), non-pharmacological relief methods (cold compresses, distraction techniques), and when to seek medical help (Rigatto et al., 2024). Especially for patients without family support or with a low educational level, for whom the present study showed a trend toward higher pruritus levels, the development of peer support groups and linkage with psychosocial support services is recommended (Pasyar et al., 2020; Ghenaati et al., 2024). Implementation of these interventions should be accompanied by systematic monitoring and evaluation of their effectiveness to ensure continuous improvement in the quality of care.

CONCLUSIONS

The present study contributes to the understanding of the relationship between hemodialysis and pruritus in CKD, highlighting the need for an individualized approach to hemodialysis patients. The finding regarding the effect of the family environment on patients' quality of life indicates the need to integrate the family into the therapeutic plan. The development of an educational program for nursing staff in hemodialysis units is recommended, with a focus on the early recognition and management of pruritus. Future research could examine the effectiveness of targeted interventions for pruritus management, as well as the role of psychosocial factors in the onset and intensity of symptoms.

REFERENCES

- Adejumo, O. A., Madubuko, R. C., Olorok, A. B., & Aina, O. T. (2019). Skin changes and dermatological life quality index in chronic kidney disease patients in a tertiary hospital in Southern Nigeria. *Nigerian Journal of Clinical Practice*, 22(2), 245–250. https://doi.org/10.4103/njcp.njcp_270_18
- Adejumo, O., Akinbodewa, A., Alli, O., Olatunji, A., & Ibukun, I. (2016). Prevalence, pattern and association of pruritus with quality of life in chronic kidney disease patients attending kidney care centre, Ondo City, Southwest Nigeria. *Ethiopian journal of health sciences*, 26(6), 549. <https://doi.org/10.4314/ejhs.v26i6.7>
- Hatano, M. (2013). *Nephrology: Volume I* (Vol. 1). Springer.
- Alkhafaji, M. S., & Al-Mayahi, A. M. (2023). Effectiveness of an educational program on hemodialysis patients' knowledge about uremic pruritus. *Pakistan Heart Journal*, 56(2), 397–406.
- Altınok Ersoy, N., & Akyar, İ. (2019). Multidimensional pruritus assessment in hemodialysis patients. *BMC nephrology*, 20(1), 42.
- Ghenaati, N., Zendehtalab, H. R., Namazinia, M., & Zare, M. (2024). Peer support groups and care burden in hemodialysis caregivers: a RCT in an Iranian healthcare setting. *BMC nephrology*, 25(1), 371.
- Kiliś-Pstrusińska, K., Wasilewska, A., Medyńska, A., Bałasz-Chmielewska, I., Grenda, R., Kluska-Jóźwiak, A., ... & Zwolińska, D. (2013). Psychosocial aspects of children and families of children treated with automated peritoneal dialysis. *Pediatric Nephrology*, 28(11), 2157–2167.
- Kisomi, Z. S., Taherkhani, O., Mollaei, M., Esmaeily, H., Shirkhanloo, G., Hosseinkhani, Z., & Amerzadeh, M. (2024). The moderating role of social support in the relationship between death anxiety and resilience among dialysis patients. *BMC nephrology*, 25(1), 100.
- Mahmoud, M., Hassan, N., Abd Elhameed, S., & Shebl, A. (2018). Relationship Between Pruritus and Quality of Life of Elderly Patients Undergoing Hemodialysis. *IOSR Journal of Nursing and Health Science*, 7(3), 73–82.
- Maya Granados, N., Valdez Ortiz, R., & Mayoral Reyes, H. (2016). Chronic kidney disease associated pruritus impact on dermatological quality of life of patients with chronic renal replacement therapy in hemodialysis from the General Hospital of Mexico. 74(5), AB168–AB168.
- Pasyar, N., Rambod, M. and Jowkar, M., 2020. The effect of peer support on hope among patients under hemodialysis. *International journal of nephrology and renovascular disease*, pp.37–44.
- Poku, E., Harnan, S., Rooney, G., James, M. M.-S., Hernández-Alava, M., Schaufler, T., Thokala, P., & Fotheringham, J. (2022). The relationship between chronic kidney disease-associated pruritus and health-related quality of life: A systematic review. *Clinical Kidney Journal*, 15(3), 484–499. <https://doi.org/10.1093/ckj/sfab218>
- Rehman, I. U., Lai, P. S., Kun, L. S., Lee, L. H., Chan, K. G., & Khan, T. M. (2020). Chronic kidney disease-associated pruritus and quality of life in Malaysian patients undergoing hemodialysis. *Therapeutic Apheresis and Dialysis*, 24(1), 17–25. <https://doi.org/10.1111/1744-9987.12862>
- Rehman, I. U., Munib, S., Ramadas, A., & Khan, T. M. (2018). Prevalence of chronic kidney disease-associated pruritus, and association with sleep quality among hemodialysis patients in Pakistan. *PloS one*, 13(11), e0207758. <https://doi.org/10.1371/journal.pone.0207758>
- Rigatto, C., Collister, D., Granger-Vallée, A., Girard, L., Hingwala, J., Karaboyas, A., ... & Tennankore, K. (2024). Pathways for diagnosing and treating CKD-associated pruritus: a narrative review. *Canadian Journal of Kidney Health and Disease*, 11, 20543581241238808.
- Verduzco, H. A., & Shirazian, S. (2020). CKD-associated pruritus: New insights into diagnosis, pathogenesis, and management. *Kidney international reports*, 5(9), 1387–1402. <https://doi.org/10.1016/j.ekir.2020.04.027>
- Vernon, M. K., Swett, L. L., Speck, R. M., Munera, C., Spencer, R. H., Wen, W., & Menzaghi, F. (2021). Psychometric validation and meaningful change thresholds of the Worst Itching Intensity Numerical Rating Scale for assessing itch in patients with chronic kidney disease-associated pruritus. *Journal of patient-reported outcomes*, 5(1), 134.
- Xie, Q., Hu, N., & Chen, Y. (2022). Chronic kidney disease-associated pruritus significantly impacts on quality of life of patients on haemodialysis and associates with increased levels of serum calcium and phosphorus. *Postgraduate medical journal*, 98(1161), e16–e16. <https://doi.org/10.1136/postgradmedj-2020-139688>