Assessment of pruritus status and its relation to dialysis adequacy and laboratory factors among hemodialysis patients

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Abstract

Introduction: This study aimed to determine the status of pruritus and its relation to dialysis adequacy and laboratory factors among hemodialysis patients in Shiraz dialysis centers so that appropriate interventions could be planned for promotion of the life quality.

Materials and Methods: This is a cross-sectional study on the data collected from 141 patients selected by convenient sampling. We used a questionnaire, interview, and lab test for data collection. Data were analyzed using SPSS 11.5 software and appropriate tests. A p value=0.05 was considered as the significance level.

Results: The mean age of our patients was 53±16 years, (82.3% were married), and 53.2% of them were male. Of these patients, 39.7% had pruritus and most of them (48.1%) reported they had pruritus in different times of the day. A significant correlation was found between dialysis adequacy and pruritus (p=0.029), and the correlation of pruritus and high sensitive-C-reactive protein (hs-CRP) was significantly positive (p=0.009).

Conclusion: Pruritus is a common problem in hemodialysis patients and is significantly associated with dialysis adequacy and hs-CRP. The level of their quality of life could be enhanced by appropriate interventions.

Keywords: Blood, Pruritus, Hemodialysis

Introduction

Chronic renal disease represents a clinical condition in which irreversible loss of kidney function has reached a stage that requires patient’s permanent dependence on renal replacement therapy. Modern renal failure treatment methods have improved life expectancy and thus, quality of life is highly important in these patients (1-2). Among problems that undermine quality of life in these patients, several skin problems could be noted including: skin dryness (xerosis/keratosis), hyperpigmentation (darkening), calcification, discoloration, pruritus, contact dermatitis, bullous dermatosis, and nail changes (1-5). Among these, pruritus is the most common problem with unknown causes, and such factors as: secondary hyperparathyroidism, divalent ion disorder, allergy, iron deficiency anemia, peripheral neuropathy, and proliferation of mast cells have been proposed as possible causes (2). Kidney dysfunction or inefficiency of dialysis leads to
accumulation of substances that cause pruritus in these patients.

According to different studies conducted in this area, prevalence of this problem has been reported from 40% in Gorgan-Iran to 67% in Saudi Arabia (1-8). Along the same lines, studies have been conducted to investigate association of pruritus with various factors including demographic, medical, laboratory, etc (1-8).

Given the lack of studies in this area in dialysis centers in Shiraz city, this study was conducted to determine pruritus status and its association with laboratory factors and dialysis efficiency in patients with renal failure undergoing hemodialysis at dialysis centers affiliated to Shiraz University of Medical Sciences, so that interventions could be planned to enhance quality of life in these patients.

Materials and Methods:

In this cross-sectional analytical study, 141 hemodialysis patients were selected by convenient sampling out of those admitted to dialysis wards at Namazi and Sahraee hospitals. A sample size of 144 was determined based on standard deviation 4.5, and differential item functioning of 2, with 90% power, and 5% error according to a pilot study conducted to test the assumption made about main variables mean. Study inclusion criteria were over 18 years of age, and over 3 months’ history of hemodialysis. Those patients with skin diseases or unwilling to take part were excluded.

Data collection and assessment of the study inclusion/exclusion criteria was done by a trained General Practitioner. Also, the dermatologist’s diagnosis and clinical tests were taken into consideration. Patients’ records were used to collect some of the data and laboratory parameters including hemodialysis, white blood cells, creatinine, cholesterol, triglycerides, calcium, phosphorus, albumin, and glucose, and were recorded in data forms. Inflammatory protein-c and parathyroid hormone were also measured. Information about the

status and history of patients’ pruritus were collected through interviews with the physician. Severity of pruritus was assessed through a questionnaire whose validity had been already confirmed by nephrology and dermatology experts. Cronbach’s alpha was found 0.86 in a pilot study on 25 patients. Scoring model in this questionnaire was based on a study by Pauli-Magnus et al., and according to pruritus duration, pattern, and severity (mild, moderate, and severe). Dialysis adequacy index (KT/V) was calculated using Daugirdas formula (9). Indices equal to or higher than 1.2 indicate adequacy of dialysis (10).

\[
KT/V = \{-\ln (R-0.03) + ((4-3.5R) \times (UF-W))\}
\]

UF= weight loss (kg)
W= weight after dialysis (kg)
R= after dialysis to before urea ratio
T= dialysis duration (hours)

Data were analyzed in SPSS software using statistical descriptive tests, t-test, Mann-Whitney U test, and Fisher’s exact test, with significant level considered 5%.

Results

In this study, 141 patients were investigated, with age ranging from 18 to 91 years, and mean age 53±16 years, 53.2% were male, and majority (82.3%) were married. Other characteristics of patients are presented in table 1.

Of the total number of patients, 56 (39.7%) had pruritus, and their status are presented in table 2. Of the patients with pruritus, 3.12% described their condition as severe, 21.4% stated that their scratching had led to wounding themselves, 3.6% said their pruritus had badly troubled them in the past 4 weeks.

According to the general physician’s examination, of all patients, 96 (68.1%) had skin signs including xerosis (90.7%), partially discolored nail (6.5%), skin hyperpigmentation (27.8%), discoloration (33.3%), calcification (7.9%), and paresthesia (10.2%).
Table 1: Details of study hemodialysis patients in Namazi and Sahraee hospitals-Shiraz (n=141)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Sub-group</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause of kidney failure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>39(27.7)</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>47(33.3)</td>
<td></td>
</tr>
<tr>
<td>Kidney stone</td>
<td>13(9.2)</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>3(2.1)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>35(25.5)</td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>25(17.7)</td>
<td></td>
</tr>
<tr>
<td>Chronic heart failure</td>
<td>2(1.4)</td>
<td></td>
</tr>
<tr>
<td>Other heart diseases</td>
<td>46(32.6)</td>
<td></td>
</tr>
<tr>
<td>Neurological diseases</td>
<td>5(3.5)</td>
<td></td>
</tr>
<tr>
<td>Thyroid diseases</td>
<td>7(5)</td>
<td></td>
</tr>
<tr>
<td>Liver diseases</td>
<td>4(2.8)</td>
<td></td>
</tr>
<tr>
<td>Parathyroidectomy</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>Dry skin</td>
<td>22(15.6)</td>
<td></td>
</tr>
<tr>
<td>Eczema</td>
<td>2(1.4)</td>
<td></td>
</tr>
<tr>
<td>Bullous skin disease</td>
<td>1(0.7)</td>
<td></td>
</tr>
<tr>
<td>Psoriasis</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cellulitis</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>16(11.3)</td>
<td></td>
</tr>
<tr>
<td>Anti-hypertension</td>
<td>89(63.1)</td>
<td></td>
</tr>
<tr>
<td>Anti-hyperlipidemia</td>
<td>11(7.8)</td>
<td></td>
</tr>
<tr>
<td>Anti blood pressure</td>
<td>5(3.5)</td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td>15(10.6)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>107(75.9)</td>
<td></td>
</tr>
<tr>
<td>No medication</td>
<td>3(2.1)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Frequency distribution of pruritus in hemodialysis patients in Namazi and Sahraee hospitals-Shiraz (n=141)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Itchy skin</strong></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>83(58.9)</td>
</tr>
<tr>
<td>Yes</td>
<td>56(39.7)</td>
</tr>
<tr>
<td><strong>Minimum 3 times itching in past 3 weeks</strong></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>14(25)</td>
</tr>
<tr>
<td>Yes</td>
<td>26(47.3)</td>
</tr>
<tr>
<td><strong>Regular itching pattern (past six months)</strong></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>29(52.7)</td>
</tr>
<tr>
<td>Total</td>
<td>56(100)</td>
</tr>
<tr>
<td><strong>Severity of itch</strong></td>
<td></td>
</tr>
<tr>
<td>Weak</td>
<td>13(23.6)</td>
</tr>
<tr>
<td>Moderate</td>
<td>21(38.2)</td>
</tr>
<tr>
<td>Severe</td>
<td>21(38.2)</td>
</tr>
<tr>
<td>Total</td>
<td>56(100)</td>
</tr>
<tr>
<td><strong>Itching sensation without need to scratch</strong></td>
<td></td>
</tr>
<tr>
<td>3(5.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Itching sensation with need to scratch</strong></td>
<td></td>
</tr>
<tr>
<td>32(57.1)</td>
<td></td>
</tr>
<tr>
<td><strong>Scratching causing skin erosion</strong></td>
<td></td>
</tr>
<tr>
<td>7(12.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Scratching causing wounds</strong></td>
<td></td>
</tr>
<tr>
<td>12(21.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Itching leading to restlessness and trouble</strong></td>
<td></td>
</tr>
<tr>
<td>2(3.6)</td>
<td></td>
</tr>
</tbody>
</table>

Site of the itch was the whole body in 33.3% of patients with pruritus, head and neck in 5.6%, abdomen in 24.1%, and limbs in 37%. At night 40.7% of patients had pruritus, but mostly (48.1%) varied during the day. Patients’ laboratory results were used to assess blood factors effecting pruritus. Patients were divided into two groups according to whether they had a regular pattern of itching over the past 6
months, or not, and cut-off point of dialysis adequacy index was 1.2. In total, 65.2% of patients had higher dialysis adequacy index. Results also indicated a significant correlation between pruritus and lower dialysis adequacy index (less than 1.2), and 66.7% of patients with regular skin itch had dialysis adequacy index less than 1.2, (P=0.029).

Table 3 presents means and standard deviations of blood factors in the two groups of patients, (group with, and group without the itching). Significant differences in means were calculated using t-test and Man-Whitney U test. Results show that pruritus is correlated with high hs-CRP blood level. In other words, hs-CRP was higher in patients that reported pruritus compared to those that did not (7.9±3.9 against 3.9±3.8, P=0.009).

Although, no significant differences in other factors’ means were observed between the two groups, there were significant clinical differences in all factors between them. Also, no significant difference in pruritus was observed between patients with dry skin history and patients with no such a history (54.7% against 37.6%, P=0.137).

Discussion
Patients with renal failure are exposed to diseases that reduce their quality of life (3, 11-12). In the present study, nearly 40% of patients reported pruritus, which was severe in 3.12% of them. Site of itching was described whole body in 33.3%, and the limbs in 37%. Furthermore, 48.1% reported a varied time of itching during the day. Pruritus was not significantly correlated with any of the demographic parameters.

Results of a study in Turkey revealed that, in total, 50.2% of hemodialysis patients suffered pruritus. These patients reported itching rather in the abdomen area (34%). In these patients, pruritus occurred more at night (48%), and then, varied during the day in 40%. Pruritus was reported significantly more by the male patients. However, no significant difference was observed in other demographic variables (8). In another study in Saudi Arabia (7), prevalence of pruritus in hemodialysis patients was 67%, and it was reported severe in 16.4% of patients. No significant difference was found between male and female patients. Pruritus was found...
Assessment of pruritus status and its
significantly more among the over-45-year-old age group. Most patients reported
site of itching in more than one place, and
then whole body (7). A multicentric study
showed that in England and Japan, more of
the patients who reported severity of
pruritus moderate to severe were male (4).
Some studies in this area have also been
conducted in Iran (1-2, 6, 12-13). In
Bandar Abbass, it was shown that 58.3% of
patients had pruritus. Patients
undergoing hemodialysis twice or less per
week were more involved with pruritus
compared to patients with twice or more
hemodialysis per week (1). A similar study
in Ahwaz showed that 58.3% of patients
suffered pruritus, but no significant
correlation was observed between this
problem and demographic and treatment
variables (13). Also, in Gorgan, pruritus
was reported in 40% of hemodialysis
patients (2).
The present study showed that patients
with higher dialysis adequacy index
(1.2<KT/V) reported less incidence of
pruritus in the past 6 months. Other studies
confirmed this report (14-16). However,
some others did not reach this conclusion
(12, 8). Reduced renal function or
 inadequacy of replacement treatment leads
to accumulation of substances in the body
that cause pruritus in these patients (14).
Thus, perhaps by improving dialysis
adequacy, the severity of pruritus can be
reduced. As it has been shown in a study
that prevalence of urea symptoms is
significantly reduced by daily increase in
dialysis fluid, and accordingly, researchers
of current study concluded that this could
also be true for pruritus (16).
In the present study, it was shown that hs-
CRP level was significantly higher in
patients with pruritus. In another study a
significant correlation was found between
high CRP and uremic pruritus (3, 17). In a
study conducted in Tehran, it was found
that CRP level was higher in patients with
severe pruritus although this was not
significant (12). This can be explained by
the relationship between uremic pruritus
autophyiology with metabolic-
inflammatory factors (3). In other words,
by increasing TNfα (tumor necrosis factor-
alpha) uremia could set-off inflammatory
process of IL6 (CRP, interleukine 6) (17).
There are many factors such as: dialysis,
stress, and infection that can cause
inflammation in these patients (17). Also,
pruritus can be due to dry skin (3).
According to the findings of the present
study, parathyroid hormone level was
lower in patients with pruritus compared to
patients without pruritus, even though the
difference was insignificant. In
comparison with the present study, in
another study, a significant reduction in
albumin and thyroid hormone was reported
in patients with pruritus. However, as in
similar studies, in this study, no significant
correlation was found between pruritus
and laboratory factors such as: hemoglobin,
white blood cells, creatinine,
cholesterol, triglyceride, calcium,
phosphorus, blood glucose, and albumin
(3, 17, and 12).
In this study, as in other similar studies, no
significant correlation was found between
pruritus and medication intake (5, 8, 14),
or patients’ dialysis history (8). Although
in some studies, correlation between
pruritus and medication like angiotension-
converting enzyme inhibitors (ACI) was
significant (18). Also, an indirect and
significant correlation has been shown
between pruritus and furosemide (18).

Conclusion
Results obtained indicate that pruritus is a
common problem among hemodialysis
patients. According to the results, pruritus
is significantly correlated with dialysis
adequacy and one of the inflammatory
factors (CRP). Therefore, it is expected
that by appropriate interventions to
enhance quality of hemodialysis and also
by providing continuous monitoring of
services to this group of patients, pruritus
can be reduced, and hence, the quality of
life in these patients is improved.
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References: