Renal Data from Asia – Africa

A Comparison of Socioeconomic Level among Hemodialysis Patients and Normal Controls in the Fars Province, Iran

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ABSTRACT. Chronic kidney disease (CKD) is a public health problem and it is suggested that low socioeconomic status (SES) may increase the risk of renal failure. The aim of this study was to report and compare the SES of hemodialysis patients (HD) and normal population in Shiraz, Iran. In this cross-sectional study, we evaluated 519 HD patients and 900 normal controls. We asked about SES using a questionnaire. The participants were categorized into three groups according to their SES as low, medium, and high SES. Of the 1419 participants, 454 (31.7%), 581 (40.6%), and 395 (27.6%) were grouped in low, medium, and high SES, respectively. Most of our normal controls (43.5%) were in the medium SES group and most of the HD patients (61.3%) were in the low SES group. HD patients had a significantly lower SES score than the normal population (P <0.001). A pattern of decrease in the child number and increase in the marital age was seen associated with a rise in SES status among the two groups. In contrast with the control population, a pattern of increasing age was seen in the HD patients with a higher SES status (P = 0.038). In conclusion, SES was significantly lower in HD patients than the normal population. People with CKD and limited education or lower income should be targeted for early intervention.

Introduction

Chronic kidney disease (CKD) is a major public health problem leading to end-stage renal disease (ESRD), associated with a rapid increase in its global incidence and prevalence particularly in developing countries such as Iran.¹,²

Recently, a paradigm shift has occurred with an emphasis on the effect of socioeconomic status (SES) on the development of this disease.³ SES is often measured as a combination of education, income, and occupation. It is commonly conceptualized as the social standing or class of an individual or group. Furthermore, an examination of SES reveals inequities in the access to and distribution of
resources. The existence of health inequities provides unique opportunities for understanding health-care system factors that can lead to improved clinical outcomes.\textsuperscript{4,5} Socioeconomic disparities are associated with the prevalence of disability in the general population,\textsuperscript{6} one of which is ESRD.

Recent studies have reported an inverse relationship between the incidence of ESRD and some parameters of SES.\textsuperscript{7-9} Low SES may affect health through various mechanisms, including inadequate access to health services and such preventive medical care as screening and early detection of diseases.\textsuperscript{10-12} Poor and uninsured individuals are at increased risk for substandard and delayed care.\textsuperscript{13,14} Furthermore, low SES may result in inadequate control of major risk factors of CKD such as hypertension (HTN) and diabetes mellitus (DM).\textsuperscript{15-17}

Risk factors associated with SES and kidney disease early in life include birth weight and infant mortality. Risk factors associated with individual SES later in life include DM, HTN, smoking, occupational and environmental exposures, and access to healthcare. SES may modify the effect of well-established risk factors on the development of kidney disease.\textsuperscript{3} Analysis in several countries suggests a higher incidence of renal disease in patients with low SES, defined differently in various studies.\textsuperscript{5,18,19}

Hemodialysis (HD) is the most common modality of renal replacement therapy and it is state-sponsored in Iran. Unfortunately, no significant data concerning SES of HD patients are available, particularly in our center. Thus, the aim of this study was to compare and report the SES of HD patients and normal population in Shiraz, Fars Province, Iran.

**Methods**

This cross-sectional and population-based study was conducted in Shiraz Nephro-Urology Research Center in 2014. The study was approved by the ethics committees of Shiraz University of Medical Sciences. The inclusion criteria were age 18 years or older, giving informed consent to participate in the study, and for HD groups, being on HD treatment for at least three months.

In this study, we evaluated 519 ESRD patients who were referred to all HD centers attached to the Shiraz University of Medical Sciences, Shiraz, Iran between September 2013 and September 2014. Furthermore, 900 normal controls were randomly selected from two major health centers (Engelhab and Valfajr) in the city of Shiraz, Iran as a control group.

All participants filled out a questionnaire by face-to-face interviews including demographic data and history of medical conditions as age, sex, education (father, mother, and his/her own education), occupation (father, mother, and his/her own occupation), family income, residential place, marital status, chronic medical problem, time of renal failure, and the cause of renal failure.

SES was determined by these components; education (father, mother, and his/her own education), occupation (father, mother, and his/her own occupation), family income, home status (ownership or rental), and number of family member and children. Each component was assessed by a score of 1 to 7 points for generation of a total score with a minimum of 3 and maximum of 21 points. This score has been previously used in SES studies in Germany.\textsuperscript{18,20}

Patients were classified into three groups according to their SES scores. Scores lower than eight were assumed as low SES group (Group-1), scores between 9 and 11 were named as medium SES group (Group-2), and scores higher than 12 were categorized as high SES group (Group-3).

**Statistical Analysis**

Data are presented as mean ± standard deviation for continuous variables or number and percentage for categorical variables; they were then analyzed using Chi-square, one-way ANOVA, and t-tests. For data analysis, we used Statistical Package for Social Sciences (SPSS) version 19.0 (SPSS Inc., Chicago, IL, USA) and $P < 0.05$ was considered statistically significant.
Results

Among the 1419 participants in this study, 635 cases (44.8%) were males and 784 (55.2%) were females. The mean age of the participants was 54.7 ± 21.5 years. According to the groups of SES, 454 (31.7%), 581 (40.6%), and 395 (27.6%) were categorized into Group-1 (SES score ≤8), Group-2 (SES score 9–11), and Group-3 (SES score ≥12), respectively.

The study population included 900 normal cases (63.4%) and 519 HD patients (36.6%). The demographic and socioeconomic characteristics of the studied population (normal and HD patients) are shown in Table 1. There was no significant difference between the two groups in age (P = 0.069) and marital age (P = 0.066). A significant difference was seen between the two groups according to sex, marital status and number of children (P <0.001, Table 1). Being a woman, divorced, and having children were higher among HD patients.

Data of 900 normal control population are shown in Table 2; most of them were in Group-2 SES. Age, sex, marital status, marital age, and also the number of children were significantly different in the three groups (P <0.05). For example, marital age in the highest SES group was higher than in other groups (P <0.001), and the number of children in the lowest SES group was more than the others (P <0.001).

Table 3 indicates the data of 519 patients on HD according to their SES groups. HD patients were categorized into three groups according to their SES score; most of the HD patients were in Group-1 indicating the lowest SES score. In contrast with the normal population, an increasing pattern of age was seen with a rise in the SES status (P = 0.038). In addition, a pattern of decreasing number of children and increase of marital age was seen with a rise in the SES status. A significant difference in the SES score was seen between the normal population and HD patients; the HD

Table 1. The characteristics of the total studied population among normal population and hemodialysis patient groups.

| Variable                        | Normal population (n=900) | Hemodialysis patients (n=519) | P      |
|---------------------------------|---------------------------|-------------------------------|--------|
| Age (year), (Mean, SD)          | 53.67±20.19               | 55.83±21.70                  | 0.069  |
| Marital age (year), (Mean, SD)  | 22.68±4.33                | 23.38±8.38                   | 0.066  |
| Sex (Female/male), (n, %)       | 467 (51.90)               | 317 (61.10)                  | <0.001 |
| Material status (n, %)          |                           |                               | <0.001 |
| Single                          | 225 (25.00)               | 61 (11.50)                   |        |
| Married                         | 598 (66.40)               | 324 (61.20)                  |        |
| Widow                           | 46 (5.10)                 | 144 (27.20)                  |        |
| Divorce                         | 31 (3.40)                 | 0 (0.00)                     |        |
| Number of children (Mean, SD)   | 2.33±1.30                 | 5.39±2.79                    | <0.001 |
| Socio economic score (Mean, SD) | 10.78±2.35                | 7.27±2.20                    | <0.001 |

Table 2. Data of normal control group according to groups of socioeconomic status.

| Socioeconomic status | ≤8 (n=130) | 9–11 (n=392) | ≥12 (n=378) | P     |
|----------------------|------------|--------------|------------|-------|
| Socio economic score (Mean, SD) | 7.24±0.78 (3–8) | 9.82±0.84 | 12.98±1.46 (12–21) | -     |
| Age (year), (Mean, SD)       | 55.72±12.10 | 53.66±12.00 | 52.93±9.85 | 0.020 |
| Marital age (year), (Mean, SD) | 20.11±3.56 | 22.10±4.14 | 24.35±4.17 | <0.001 |
| Sex (Female/male), (n, %)    | 109 (83.80) | 190 (48.50) | 168 (44.40) | <0.001 |
| Material status (n, %)       | 21 (16.20) | 95 (24.20) | 109 (28.80) | <0.001 |
| Single                         | 87 (66.80) | 262 (66.80) | 249 (65.90) |        |
| Married                        | 14 (10.80) | 24 (6.10) | 8 (2.10) |        |
| Widow                          | 8 (6.20) | 11 (2.80) | 12 (3.20) |        |
| Divorce                        | 2.60±1.43 | 2.44±1.38 | 2.07±1.08 | <0.001 |
patients had significantly lower SES score than normal population ($P < 0.001$). The percentage of patients with higher SES (Group-3) was lower than the normal population ($P < 0.001$). This means that most of HD patients had a significantly lower SES ($P < 0.001$).

**Discussion**

CKD is a major public health problem in Iran; however, no significant data concerning socioeconomic characteristics of HD patients in comparison with normal population are available in Iran. In our study, SES was determined by education, occupation, monthly income, and the house status.

In this study, most of the normal controls were in the medium and most of the HD patients were in the lowest SES group. Previous studies have indicated that the incidence of ESRD is related inversely to SES.\(^7\)\(^9\) This finding can be associated with the influence of SES on the incidence of HTN and DM as the risk factors of ESRD.\(^17\)\(^21\)\(^27\) It has been reported that the prevalence of HTN is related inversely to such socioeconomic factors as income, educational level and availability of health insurance.\(^17\)\(^23\) Furthermore, DM is the most commonly attributed cause of ESRD,\(^26\) and the risk for diabetes is inversely associated with SES.\(^24\)\(^25\) Therefore, blood pressure and DM may be the important links between the SES and incidence of ESRD. Some groups have investigated the relationship between survival and SES in the ESRD population.\(^26\)\(^27\) In addition, Port et al\(^27\) showed that higher SES is associated with improved survival in ESRD patients.

These results could be due to the fact that patients with lower SES groups are often uninsured and have restricted access to health facilities.\(^4\)\(^29\) Furthermore, women may exhibit a lower SES score than men because of the likely lower income and more unemployment, an issue that makes independent analysis of gender difficult.

A relationship between ESRD and SES has been described in several preliminary reports. Rostand noted a strong and direct correlation between the number of patients with ESRD and the number of households with low income.\(^30\) In a case–control study, the risk of ESRD was inversely related to annual income and years of schooling.\(^31\) The income measurement was not described but it is important to realize that individual income may decrease because of renal failure.

One limitation of the present study is that the analysis is based on the current data. We believe that a major influence of SES change due to loss of work and/or inability to work after initiating dialysis is unlikely. In addition, changes in the SES status during lifetime could occur and this was not assessed in our study. Our data may have bias as these results could be due to the refusal of people to give honest information concerning household net income or allowance to save these data. In addition, in our study, we did not match basic characteristics such as age or sex but inclusion criteria as the age of 18 years or older was considered in our study.

| **Socioeconomic status** | $<$8 ($n=318$) | 9–11 ($n=184$) | $\geq$12 ($n=17$) | $P$ |
|-------------------------|----------------|----------------|-----------------|----|
| Socioeconomic score     | 5.75±1.18 (3-8)| 9.47±0.72 (9-11)| 12.14±0.67 (12-21)| -  |
| Age (year)              | 54.70±21.15    | 58.20±21.15    | 62.94±18.80     | 0.038 |
| Marital age(year)       | 21.86±8.40     | 25.61±8.02     | 26.05±5.82      | <0.001 |
| Age (year) at disease   | 49.68±20.23    | 53.41±18.16    | 56.11±16.70     | 0.067 |
| Sex (Female/male)       | 153 (48.10)    | 152 (82.60)    | 12 (70.60)      | <0.001 |
| Material status         |                |                |                 |    |
| Single                  | 42 (13.00)     | 19 (10.10)     | 3 (0.00)        | 0.404 |
| Married                 | 196 (60.70)    | 115 (60.80)    | 13 (76.50)      |     |
| Widow                   | 85 (26.30)     | 55 (29.10)     | 4 (33.50)       |     |
| Number of children      | 5.55±2.70      | 5.34±2.92      | 3.25±1.87       | 0.005 |
Conclusion

SES was significantly lower in HD patients than the normal population. In HD patients, a pattern of increasing age, marital age, and disease presentation and also decrease in the number of children was seen with a rise in the SES status. People with CKD and limited education or lower income should be targeted for early intervention to limit disability and further loss of income, both of which could worsen outcomes in CKD.

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