



## Effect of Kidney Transplantation on Smoking Habits of Kidney Donors

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### ABSTRACT

**Introduction.** Smoking increases the risk for cardiovascular disease in kidney donors, as is the case with normal individuals; it may also result in the development and progression of chronic renal failure. The present study aimed to investigate the effect of kidney transplant on smoking habits of kidney donors.

**Method.** The study included 98 donors in total (54 female, 44 male). A questionnaire was administered to donors about smoking status. Smoking status was asked about before surgery and 12 months postoperatively, and the preoperative and postoperative values were compared. The Fagerstöm test for nicotine dependence was administered to individuals who were still smokers and those who had smoked but quit.

**Results.** The mean age of the participants was  $48.27 \pm 10.8$  years. The preoperative smoking status was 47% ( $n = 46$ ), whereas the postoperative rate decreased to 29% ( $n = 28$ ). This reduction in smoking rate was significant ( $P = .001$ ). There was no difference in Fagerström levels between donors who continued smoking and those who quit smoking after the surgery ( $P = .583$ ).

**Conclusions.** A person who becomes a kidney transplant donor has the chance to quit smoking, which is a cardiovascular risk factor. In addition to the psychosocial benefits of being a donor, it should be noted that it might also provide some medical benefits. However, some patients continue smoking after surgery. Smoking should be questioned in the postoperative follow-ups of donors and the support required for smoking cessation should be provided.

**K**IDNEY TRANSPLANTATION is the preferred renal replacement therapy for patients with end-stage renal disease (ESRD), owing to its contributions to patient's quality and length of life. Kidneys can be transplanted from a cadaveric donor; however, living donors are also used owing to the volume of the wait-list [1].

Each kidney donor is a potential for at least stage 1 chronic renal disease, even with normal glomerular filtration rate (GFR) and creatinine levels [2]. In a study that investigated 96,217 donors, 1% of the donors developed ESRD and the rate of risk for developing ESRD was reported as 0.3% for every 15 years after nephrectomy [3].

The most common cause of mortality in chronic renal failure (CRF) is cardiovascular diseases. CRF is an additional risk factor increasing the risk for cardiovascular

disease. Some risk factors, such as diabetes mellitus, obesity, and smoking, play substantial roles in the development of cardiovascular disease [4,5].

The individual who becomes a donor is evaluated for the presence of diabetes mellitus, coronary artery disease, and other systemic diseases before nephrectomy, and regarded as a donor if no pathology is detected. However, smoking, a significant risk factor for cardiovascular disease, is not considered a contraindication to donation. Smoking increases the risk for cardiovascular disease in kidney donors,

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**Table 1. Sociodemographic Data of the Donors**

| Characteristic               | All Donors (n = 98) | Continued Smoking Group (n = 28) | Quit Smoking Group (n = 18) | P Continued vs Quit |
|------------------------------|---------------------|----------------------------------|-----------------------------|---------------------|
| Age (years)                  | 48.27 ± 10.8        | 44.43 ± 9.70                     | 48.89 ± 10.4                | .146                |
| Gender, n (%)                |                     |                                  |                             | .38                 |
| Male                         | 44 (44.9)           | 24 (85.7)                        | 10 (29.4)                   |                     |
| Female                       | 54 (55.1)           | 4 (14.3)                         | 8 (66.7)                    |                     |
| Affinity to recipient, n (%) |                     |                                  |                             | .411                |
| Parents                      | 39 (39.8)           | 3 (75)                           | 1 (25)                      |                     |
| Sibling                      | 24 (24.5)           | 9 (64.3)                         | 5 (35.7)                    |                     |
| Spouse                       | 20 (20.4)           | 3 (50)                           | 3 (50)                      |                     |
| Relative                     | 8 (8.2)             | 6 (100)                          | 0 (0)                       |                     |
| Youngster                    | 7 (7.1)             | 7 (43.8)                         | 9 (56.2)                    |                     |
| Educational status, n (%)    |                     |                                  |                             | .739                |
| Unschooling                  | 31 (31.6)           | 3 (37.5)                         | 5 (62.5)                    |                     |
| Primary school               | 50 (51)             | 17 (65.4)                        | 9 (34.6)                    |                     |
| High school                  | 14 (14.3)           | 7 (70)                           | 3 (30)                      |                     |
| University                   | 3 (3.1)             | 1 (50)                           | 1 (50)                      |                     |
| Occupational status, n (%)   |                     |                                  |                             | .053                |
| Housewife                    | 54 (55.1)           | 4 (33.3)                         | 8 (66.7)                    |                     |
| Retired                      | 12 (12.2)           | 5 (62.5)                         | 3 (37.5)                    |                     |
| Unskilled worker             | 11 (11.2)           | 9 (100)                          | 0 (0)                       |                     |
| Business                     | 10 (10.2)           | 8 (100)                          | 0 (0)                       |                     |
| Farmer                       | 7 (7.1)             | 1 (20)                           | 4 (80)                      |                     |
| Officer                      | 2 (2)               | 1 (50)                           | 1 (50)                      |                     |
| Employee                     | 2 (2)               | 0 (0)                            | 2 (100)                     |                     |
| Income status, n (%)         |                     |                                  |                             | .391                |
| Low                          | 43 (43.9)           | 13 (61.9)                        | 8 (38.1)                    |                     |
| Moderate                     | 53 (54.1)           | 15 (62.5)                        | 9 (37.5)                    |                     |
| High                         | 2 (2)               | 0 (0)                            | 1 (100)                     |                     |

as is the case with normal individuals, and may result in the development and progression of CRF [6,7]. Therefore, smoking by kidney donors is a significant risk factor for the progression of CRF and development of cardiovascular disease.

The present study aimed to investigate the effect of kidney transplant on smoking habits of kidney donors.

## PATIENTS AND METHODS

A total of 98 subjects with renal transplant donors were recruited from the Department of Nephrology, Ataturk University. All procedures followed the tenets of the Declaration of Helsinki.

The donors included in this study were provided with education regarding the harms of smoking through a set of visual and written materials before the surgery. A questionnaire was administered preoperatively and 12 months postoperatively. Sociodemographic data of the patients were recorded. The questionnaire included the following questions: (1) Did you smoke before organ donation? (2) For how many years have you been smoking (if a smoker)? (3) At what age did you start smoking (if a smoker)? (4) What is your smoking status after organ donation? (5) If you started smoking after organ donation, when did you start? The Fagerström test for nicotine dependence was administered to individuals who were still smokers and who had smoked but quit [8]. The questionnaires and tests were performed through face-to-face interviews.

### Statistical Analysis

Data obtained were analyzed by entering the data into the Statistical Package for the Social Sciences (SPSS) system (SPSS, Inc.

Cary, NC). For descriptive statistics, number and percent, and mean values and standard deviation were provided. Preoperative and postoperative smoking statuses were compared using the McNemar test. The Fagerström nicotine dependence levels were compared using the  $\chi^2$  test for patients who continued to smoke and who quit smoking after the surgery. Statistical significance level was established as  $P < .05$ .

## RESULTS

The study included 98 donors in total (54 females, 44 males). The mean age of the donors included in the study was 48.27 ± 10.8 years. The sociodemographic data of donors are summarized in Table 1.

Based on educational status, primary school graduates accounted for the majority with 50 (individuals 51%), and university graduates had the lowest number with 3 individuals (3.1%). Based on the donors' affinity to the patient, 39 individuals (39.8%) were children, which was ranked first, and 7 (7.1%) were parents of the donors, which was ranked least. The mean age to start smoking was 18 ± 4.5 years. Moderate income accounted for the majority with 53 individuals (54.1%). Based on occupation, homemakers accounted for the majority with 54 individuals (55.1%) and government employees accounted for the least number of participants with 2 individuals (2%).

The preoperative smoking status was 46.9% (n = 46), whereas the postoperative rate was 28.5% (n = 28). There

was a significant reduction in smoking rates of the donors after donation ( $P = .001$ ).

Of 46 donor candidates who were smoking before the surgery, 20 had low Fagerst orm levels, 9 had moderate Fagerst orm levels, and 16 had high Fagerst orm levels. In the group that is on continued smoking ( $n = 28$ ) after the surgery, Fagerst orm levels were low in 12 donors (42.9%), moderate in 6 (21.4%), and high in 10 (35.7%). In the group that quit smoking ( $n = 18$ ) after the surgery, Fagerst orm levels were low in 10 (55.6%), moderate in 2 (11.1%), and high in 6 (33.3%). There was no difference in Fagerst orm levels between donors who continued smoking and those who quit smoking after the surgery ( $P = .583$ ).

## DISCUSSION

Kidney donors have a reduced GFR by 25%–40% after nephrectomy and this poses a risk for the development of CRF and ESRD. Previous large-scale, controlled studies found an ESRD incidence of 0.1%–0.4% in kidney donors, which is significantly greater compared with the normal population. Older donor age, ethnicity (American, African), and younger age (<20 years) were reported to have a greater risk for ESRD [3,9].

The most common cause of mortality is cardiovascular diseases in CRF, as is the case with normal population. CRF is an additional risk factor increasing the risk for cardiovascular disease. Some risk factors, such as diabetes mellitus, obesity, and smoking, play substantial roles in the development of cardiovascular disease [4,5].

The individual who becomes a donor is evaluated for the presence of diabetes mellitus, coronary artery disease, and other systemic diseases before nephrectomy, and accepted as a donor if no pathology is detected. However, smoking, a significant risk factor for cardiovascular disease, is not considered a contraindication to donation. Smoking increases the risk for cardiovascular disease in kidney donors, as is the case with normal individuals, and may result in the development and progression of CRF [6,7]. Therefore, smoking among kidney donors is a significant risk factor for the progression of CRF and development of cardiovascular disease.

In kidney donors with a history of smoking before nephrectomy, the postnephrectomy increase in the creatinine level was greater compared with nonsmokers. Again, the increased creatinine and reduced GFR was greater among ESRD patients who received allografts from a smoker donor compared with ESRD patients who received allografts from a nonsmoker. Smoking cessation after nephrectomy was shown to reverse the side effects of smoking on the kidneys [10,11]. Given the adverse cardiovascular and renal outcomes of smoking in kidney donors, it is strongly recommended that kidney donors with a history of smoking before nephrectomy quit smoking [12–14].

In the literature, there are a limited number of studies examining whether there is a decline in smoking rates of smoker kidney donors after the operation. In a retrospective study comparing the pretransplant and posttransplant health behaviors of kidney donors, there was a decrease in smoking rates of the donors (28% vs 21%); however, no significant difference was found. The said study presented no information if the patients were provided with training regarding the harms of smoking before the transplant [15].

However, there are no studies in the literature that investigate the effect of kidney transplantation on smoking alone. The present study focused on these effects. The harms of smoking on general and kidney health were explained to kidney donors before surgery, and then it was investigated if there was a decrease in smoking rates after the kidney transplantation.

Our results showed a significant decrease in the smoking rates of kidney donors after the operation. However, the nicotine dependence levels were similar between kidney donors who quit smoking after the operation and those who did not. These results suggest that a significant decline may be achieved in smoking rates of kidney donors if training is provided about the harms of smoking, regardless of the high levels of nicotine dependence. However, some patients continue smoking after the surgery. Smoking status should be discussed at the postoperative follow-ups of donors and the support required for smoking cessation should be provided.

In conclusion, although the present study was conducted with a low number of kidney donors, which is a limitation, it demonstrates that kidney donors can quit smoking when they receive training about the harms of smoking.

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