

# Rate of Adenovirus Infection in Patients with End Stage Renal Disease in Kirkuk Governorate

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## ABSTRACT

Adenovirus is a DNA virus which was discovered in 1950s from military recruit with atypical pneumonia. The majority of the higher-level number for serotypes has been insulated from immunocompromised persons. While the majority of infections linked to adenovirus are self-limiting, those who occur in immunocompromised individual can be far more serious, even deadly. Patients who have reached the end of their kidney function have weakened immune response, due to high rates of infection by virus. The goal of this research was to find out the infection with adenovirus in terminal stage of kidney disease patients who undergoing hemodialysis. This study was done in Kirkuk General Hospital/Dialysis Unit in Kirkuk city from the period 12/11/2019 to 5/5/2020. Serum of 200 hemodialysis patients were investigated for both adenovirus-specific immunoglobulin G and M by using enzyme-linked immunosorbent assay (ELISA), 108 (54%) patients were males and 92 (46%) were females. The results showed that 142 patients (71%) had anti-adenovirus IgG, 10 patients (5%) had anti-adenovirus IgM and 6 patients (3%) had both anti-IgM and anti-IgG. There was no significant variance in adenovirus seropositivity ( $p > 0.05$ ) between males and females (51.26% and 48.74% respectively). The study showed that non-significant relation between the seropositivity and sex, age and residency. We advise to do adenovirus detection test to those patients who undergone dialysis to decrease the rate of adenoviruses contagion and to avoid renal transplantation failure.

**Keywords:** Adenovirus, ESRD, Dialysis.

## 1. INTRODUCTION

The double-stranded adenovirus is a DNA virus which is linear and without envelop classified under Adenoviridae family and *Mastadenovirus* genus. The first adenovirus strains were identified from lymph nodes in 1953, and the name adenovirus comes from the Greek word adénos, which means gland [1]

In the weakened immune patients, adenovirus, exactly subgroup B sorts 34, 11 and 35, has been shown to cause both tubulointerstitial nephritis and hemorrhagic cystitis <sup>(4)</sup>. Urinary tract infection is common in renal transplant patients frequently reported about 4.8%, with rare dissemination. Adenovirus caused graft rejection during renal transplantation and death from multiple organ failure <sup>(5)</sup>.

In immunocompromised patients, adenovirus infection tends to be more severe, with the possibility of a deadly consequence. In these patients, adenovirus infections may occur due to initial infection or endogenous reactivation. Infections can occur spontaneously or as a result of the reactivation of a hidden virus in the receiver or transplanted organ <sup>(2)</sup>. Hemorrhagic cystitis, colitis and disseminated illness are all clinical symptoms in weakened immune patients.

The aim of this research was to detect adenovirus infection among hemodialysis patients.

## 2. MATERIAL AND METHODS

Two hundred patients with End Stage Renal Disease (ESRD) underwent hemodialysis (108 male and 92 female) who attended to Kirkuk Hospital/Dialysis unit from the period 12/11/2019 to 5/5/2020. A questionnaire form was done for each patient. Six ml of blood was obtained, from 200 haemodialysis patients, their sera had been investigated for adenovirus IgG and IgM using standard ELISA procedure.

Chi-square test performed for data analysis. Probability value (p) of 0.05 or less considered significant, while higher values regarded a non-significant.

## 3. RESULTS AND DISCUSSION

Our research based on the study of adenovirus infection pre-renal transplantation to patients undergone dialysis although all the previous studies depend on post renal transplantation adenovirus infection therefore we didn't find enough studies close to our topic.

Seventy nine percent of hemodialysis patients reported to be infected with adenovirus, while the infected cases among the control group reported to be only 13%, this display a highly significant difference ( $p < 0.01$ ) (Table 1).

The seroprevalence of adenovirus varies in different studies. According to several prior surveys conducted across the world that 3-47% of the majority of adenovirus infections were found at transplant facilities. (6). Echavarria *et al* (7) was identified adenovirus by PCR method in 28.57 % of patients having stem cell transplantation, with no statistically significant difference ( $p > 0.05$ ). Our study with agreement with Kosulin *et al* (8) who found highly significant relation ( $p < 0.01$ ) of infection with adenovirus in pre-transplant of hematopoietic stem cell. The incidence of adenovirus has been estimated to be fewer than 23% of patient's after renal, liver, or heart operations on transplantation. Although the symptoms of adenovirus infection are often subtle, and aggressive infection is not linked to organ rejection, severe and even fatal outcomes have been reported (9, 10).

The distribution of adenovirus infection among ESRD patients according to sex was non-significant (Table 2). Although there was no significant variance ( $P > 0.05$ ), rate of males (51.26%) was higher than that of

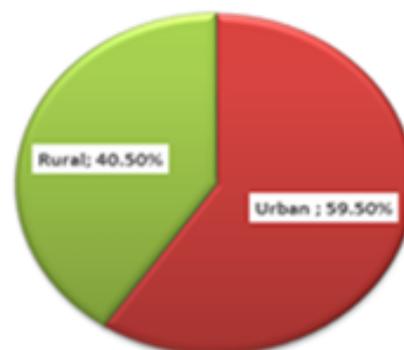
females (48.74%). In study done in Erbil province on paediatric patients, Khoshnaw *et al* (12) reported non-important relative among genders in those with infection of adenovirus. In onther study done in four Sub-Saharan countries in Africa, Pauly *et al* (11) also found no difference among patients that infected with species D-adenovirus. Ganapathi *et al* (13), found non important relation between genders in those with infection of adenoviral suffering from renal dysfunction.

According to the age, the adenovirus infection rate was greatest in patients aged from 40 years. (28.48%) and the second group those from 50 years (25.32%) (Table 3). The results were non-significant ( $p > 0.05$ ). Bruminhent *et al* (14) found the high median of adenovirus infection occurred in 47 years old males. Florescu *et al* (15) demonstrated that the rate of adenovirus infection rate was increased in adult group patients with kidney transplantation.

These age groups variations could be attributed to the immune condition of the patients or attributed to the past infection prior to the onset of chronic impairment and these patients with older ages will have the low immune response.

The research reported that 59.50% from urban areas and 40.50% were from rural areas who were infected with adenoviral infection (Figure 1). Kolawole *et al* (16) reported that the greatest rate of infection with adenovirus was found in urban area than rural area. Khoshnaw *et al* (12) reported that no relative among adenovirus infection and position. The discrepancy among these finding may be due to discrepancy in population densities between residency areas (urban vs rural), improper health cares, discrepancy in education, and other social and economic criteria.

## 4. FIGURES AND TABLES



**Figure 1** Residency distribution of infections with adenovirus among hemodialysis patients.

**Table 1** Rate of adenovirus infection among hemodialysis patients.

	Hemodialysis patients		Control	
	Number	Percent	Number	Percent
Adenovirus positive	158	79	13	13
Adenovirus Negative	42	21	87	87
Total	200	100	100	100

Chi square =118.652, P=0.000

**Table 2** Sex distribution of hemodialysis patients infected with adenovirus.

Sex	Patients with ESRD		Adenovirus positive
	No.	%	No. (%)
Male	108	54	81(51.26)
Female	92	46	77(48.74)
Total	200	100	158(79)

Chi square =0.26, p>0.05

**Table 3** Age distribution of hemodialysis patients infected with Adenovirus.

Age ( Years)	Number	Adenovirus positive	
		No.	%
20-	33	21	13.29
30-	42	32	20.25
40-	60	45	28.48
50-	41	40	25.32
60-	24	20	12.66
Total	200	158	100

Chi square=1.63, P>0.05

## 5. CONCLUSION

1. Higher rates of adenovirus infection were recorded in patients with end stage renal disease compared with healthy control.

2. Higher rates of adenovirus infections were found in patients from urban areas than those from rural areas.

3. The rates of adenovirus infections were higher in the age group 42-51 years.

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