



Prevalence of HCV Antibodies
in haemodialysis patients in El-
Giza governorate (Sector A)

Thesis

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By

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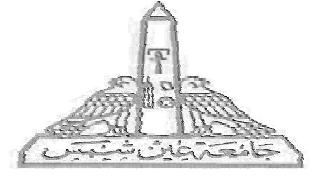
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**بحث توطئة للحصول علي درجة الماجستير في
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Summary

Hepatitis C virus (HCV) infection is prevalent worldwide, and has become a major cause of morbidity and mortality in patients on long- term hemodialysis (HD), especially in the Middle East and Far Eastern countries.

HCV infection is common among patients with end – stage renal disease (ESRD) on regular hemodialysis and it has been considered an independent risk factor for mortality in this setting.

This study is a part of project aiming to survey about HCV among HD patients, assessing its prevalence, seroconversion and the risk factors associated with HCV seroconversion among hemodialysis patients in Egypt.

This project is modulated by the nephrology department, Ain Shams University and this study administered upon **1130** ESRD patients on regular HD sessions attending 20 different HD units in Giza governorate; including: Giza city, Elharam, Fysal, Eldokki, Elagooza, Elmohandesseen, Embaba.

Patients' total number was 1130 with ESRD on regular HD; from them 677 (59.9%) males and 453 (40.09%) females.

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Aim Of The Work

The Hepatic C virus (HCV) infection and its associated risk factors among hemodialysis (HD) patients have not been well documented in Giza. The aim of this study is to determine the prevalence of HCV among different (HD) patients in the different centers in Giza and to identify its related risk factors of infection.

Discussion

Viral hepatitis is considered one of the most significant public health problems facing Egypt today.

Egypt has the highest prevalence of hepatitis C in the world. Studies have found widely varying levels (10%-50%) of the prevalence of hepatitis C, depending on the populations covered; overall, estimates of the HCV rate in the general populations have range between 10 and 20 percent (**Abdel – Aziz et al., 2000 and Deuffic et al., 2005**).Geographically, the hepatitis C prevalence has been shown to be higher in Lower Egypt (Nile Delta) than in Upper Egypt, and lower in urban compared to rural area (**Mohamed 2004**).

The present study involved **1130** patients with ESRD on maintenance hemodialysis in **20** dialysis units in **El Giza governorate** (Sector A), aiming to study the prevalence of HCV infection among them, HCV seroconversion and associated risk factors affecting it.

In the present study regarding the aetiology of ESRD, it was found that Hypertension is the commonest cause by (72.39%) followed by Diabetes Mellitus by (14.69%) as shown in (**Table11**); and this agreed with (**Fissell et al., 2004**); (**Afifi et al., 2008**) and (**Gudithi et al., 2011**) who reported that

hypertension and diabetes mellitus were the main causes of renal failure. That results differ from other universal studies which consider DM main cause of ESRD more than HTN; as HTN could be a cause for the disease and also it may occur as a result of ESRD discovered just before or at the time of HD. In addition the effect of ESRD on decreasing insulin requirements in diabetic patients, may lead the patients to neglect DM from their history of illness or even consider themselves cured from DM; that false history or misdiagnosis may be the cause.

In our study, it was noticed that by the time of the study, HCV prevalence was **47%** (531 HD patients) with 122 patients HCV **seroconverted (16.9%)** after the start of dialysis; (**Table 8,9 and Figure 9&10**) with mean duration of HD 3.76Y; (**Table 13**) with a seroconversion rate of 4.49% per year.

This high rate of HCV prevalence agreed with (**Thompson et al., 2009 and Fabrizi & Martin 2010**) who stated that patients with chronic renal insufficiency on renal replacement therapy (RRT) with hemodialysis have higher infection rates for Hepatitis C virus (HCV) than the general population. Rates in developed countries such as Holland (4%), the United Kingdom (4%), Germany (7%), Belgium (7%) and Sweden (10%) are low. However, prevalence is a little bit higher in the USA (14%), France (15%), Spain (22%) and Italy (22%). In developing

countries prevalence is higher: in Brazil (18%), in Turkey (21%), in the Sudan (22%), in Tunisia(24%), in Saudi Arabia (45%), in Moldavia(74%), in Morocco(78%) and in Egypt(80%). Despite clearly indicated reductions in these rates related to the implementation of biosafety measures in recent years, Hepatitis C continues to be an important problem in these populations.

Also, this study agreed with **(Afifi et al., 2008)** who stated that the prevalence of HCV in HD patients in Egypt reached about 52.3%.

The prevalence of HCV is variable among HD centers within the same country as noticed by **(Heterogenius 2009)** who stated that, the prevalence of HCV varies throughout the country. Available data suggests that the northern Nile Delta has the highest prevalence (~28.4%). The much smaller population of Upper Egypt, in the south, has a slightly lower HCV prevalence (~19.4%). The two major urban centers, Cairo and Alexandria, have the lowest prevalence of (~ 8.2%) and (~5.9%) respectively.

In the studied group, the number of male patients was 677 (59.9%) and that of female patients was 453 (40.1%). According to the Univariate analysis of categorical risk factors for seroconversion, recorded in **(Table 5 & Fig 5)** it was found that there was no significant correlation between HCV seroconversion in HD patients with **gender** (male or female), and these results

agreed with (**Amiri et al.,2005**) and (**Badr 2011**) who reported that the relationship between gender and HCV seroconversion was not significant ($p\text{-value} > 0.05$), while in contrast with (**Mitsui & Iwano 1992**) who found that male gender is one of the accepted risk factors for anti- HCV positivity in dialysis patient. Our results were also in dissimilarity with (**Ray Kim 2002**) who reported that men were 20% more likely at risk to be infected with hepatitis C than women and it was more common in persons 30 to 90 years of age. Also, our study disagreed with (**Alashek & Altagdi 2007**) who found that males were affected with HCV more than females and they presented themselves to the clinic at a younger age and with (**Heterogenius 2009**) who concluded that in Egypt, male patients had more rapid disease progression than females; In addition to age, fatty liver, HIV infection and alcohol consumption which are also important risk factors.

In the present study, it was found that there was a significant relationship between patient **age** and HCV seroconversion in HD patients; with mean age 59.03Y (± 11.54) of HCV seroconverted patients (**Table 13**).The highest rate of prevalence (37.61%) was found among age group of 60 -70 years old patients, followed by age group of 50 -60 years old patients by (32.21%) (**Table 6**).

Our results agreed with (**Glammaria et al., 1992**), who found that HD patient age has been considered as a powerful predictor of the

risk acquisition of HCV infection and also with **Heterogenius** who reported that increasing age associated with more rapid progression of HCV disease in Egypt(**Heterogenius 2009**). But our results disagree with **Badr** who found that there was no significant correlation between HCV seroconversion in HD patients with age (**Badr 2011**).

This study indicated that the **duration** of HD was significant risk factor in both Univariate analysis and Multivariable logistic regression analysis for HCV seroconversion; with mean duration of dialysis 45.17 month(± 36.866) i.e. 3.76 years for seroconverted patients (**Table 13**).

It was noticed that the longer the duration of dialysis, the higher the incidence of seroconversion. These results agreed with (**Natov et al.,1998**) who concluded that the longer dialytic age facilitates nosocomial transmission of HCV mainly by increasing the span of exposure of patients to the high- risk HD environment. Our study was also in agreement with **Gul & Iqbal** who found that many patients on dialysis have been noted to become HCV positive in high numbers with the passage of time; (**Gul & Iqbal 2003**) and with (**Zarkoon et al., 2008**) who stated that the risk of getting HCV infection was found to be significantly associated with increasing years of dialysis; also agreed with (**Jasuja et al., 2009**)

who reported that 45.2% of patients with duration of dialysis more than 16 month were HCV- RNA positive, while only 7.4% of patients with dialysis duration $\leq$ 16months were HCV-RNA positive ($P= 0.001$). On the other hand our results in contrast with **Badr** who found that no significant difference between HCV free patients and HCV seroconverted patients by duration of dialysis (**Badr 2011**).

In this study, there was no significant relationship of **blood transfusion** on HCV seroconversion in HD patients with univariate analysis(52.4% versus 44.5%received blood transfusion in both HCV free and seroconverted HD patients, respectively) (**Table 15**).

But by multivariable regression test,Blood transfusion found to be an important risk factor for HCV seroconversion.

Our study agreed with (**Natov & Pereira 1996**) who reported that blood transfusion was a major risk for acute infection in the past with more than 10 % of transfusion recipients acquiring infection in some studies; also agreed with (**Perez et al., 2003; Echevarria et al., 2005 and Moreira et al., 2005**) who estimated that affected individuals are mostly patients who undergo multiple blood transfusions, and intravenous patients; also with (**Serzer et al., 2006**) who reported that HCV is mainly transmitted by blood transfusion. While, the present study disagreed with (**Okude et**

al., 1995) who reported that the mode of HCV infection not associated with blood transfusion among chronic HD patients, **(Van der Poel 1999)** disagreed with our results when reported that blood transfusions are no longer considered a major risk factor as with routine HCV screening through highly sensitive tests (ELISA-HCV) for blood donors, the risk of post-transfusion HCV infection,(<1/100.000 blood units) is virtually negligible; and also in contrast with **(Kumar et al., 2011)** who found no significant association between blood transfusion and the anti-HCV positivity.

The initiation of donor screening for anti HCV antibodies in 1990 has nearly eliminated the risk of post- transfusion acute HCV infection **(Donahue et al., 1992)**. Careful selection of blood donors, proper screening of blood and blood products and use of 3rd generation HCV test (ELISA 3) play an important role in controlling HCV transmission through blood transfusion. Also usage of erythropoietin instead of blood derivatives may cause significant reduction in HCV transmission by blood derivatives **(Alavian 2009)**.

In the present study, there was a significant relationship between the history of previous **surgery** and HCV seroconversion rate in both Univariate and Multivariable analysis; as about

(58.2%) of HCV seroconverted patients had positive history of previous surgery, while that of persistent HCV free patients was (32.7%), (**Table 16**). This agreed with **Mohamed**, who found that medical interventions including surgery were associated with increased risk of HCV infection in a study of HCV infection among Egyptian workers in the 1990s (**Mohamed 2004**), that also coincident with (**Zarkoon et al.,2008**) and (**Kumar et al., 2011**) who found that previous surgery plays a role in developing HCV infection in their patients. On the other hand (**Jabbari et al.,2008**) disagreed with our study who concluded that medical procedures including surgery were not significantly related to HCV antibody status; and also disagreed with **Badr** who found that the number of HCV seroconverted patients who underwent surgery was not significant(**Badr 2011**).

Our study revealed that **switching of dialysis** between centers had a significant relationship with HCV seroconversion rate in Univariate and Multivariable analysis; as 74 patients (60.66%) of 122 seroconverted cases had a history of switching dialysis (**Table 17**).

That results agreed with (**Carneiro et al., 2005**) who stated that significant effect of switching dialysis and HCV transmission, also with (**Jasuja et al., 2009**), they found that 39% of patients who had dialysis at more than one center were HCV- RNA

positive as compared to 20% for patients undergoing dialysis at single center and agreed with **Badr** and **(Kumar et al., 2011)** who found significant association between dialysis in different HD units and HCV transmission(**Badr 2011**). That can be a result of failure of proper administration of infection control measures in different centers at the same level.

In the present study **isolation procedures** were not significant risk factor for HCV seroconversion; that agreed with **(Fissell et al., 2004)** who stated that there is no evidence that isolation of patients infected with HCV is associated with decreased risk of HCV seroconversion; as after adjustment of infection control measures, isolation does not protect against HCV transmission in HD patients. But , our result disagreed with (**Garcia et al. 1993 ; Dos santos et al., 1996; Rais –Jalai & Khajehdehi 1999** and **Aucella et al.,2000**)who explain that the use of dedicated machines and isolated area for anti- HCV positive patients along with strict enforcement of universal precautions was associated with a decrease in the incidence of seroconversion. Also, with **(Abd Allah et al., 2010)**who reported that the practice of dialysis both HCV positive and negative patients in the same room, without separate machines, might be the underlying reason why these patients are more prone to acquire HCV.

According to (**Alavian 2009**), it is not clear whether isolation of patients, use of independent machines or reusability of filters have any relation to prevention or to HCV transmission risk.

In our study, despite that **infection control** measures were applied in all mentioned HD centers, there was HCV seroconversion in 122 patients with ESRD on regular HD. It seems to be caused by improper administration or failure of strict adherence to universal precautions of infection control, such as:

1. Medicine preparation in separated areas.
2. Avoiding the use of the same vials for several patients (e.g. for heparin).
3. Disinfecting surfaces, equipment and circuits after use or treatment of each patient.
4. Washing hands and changing gloves between patients (**Alavian 2009**).

Universal precautions is the most significant measure for control of HCV transmission. However, actual practice of universal precautions by dialysis technicians and nursing staff are probably lacking. Implementation of universal precautions remains the best way to control transmission of HCV. Dialysis units need to review and rework strategy for controlling transmission of HCV in dialysis population (**Jasuja et al., 2009**). In addition lack of strict adherence to standard precautions by the