

Renal Replacement Therapy And Increased Risk Of Cardiovascular Disease In El-Minia Governorate, Upper Egypt

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Abstract

Introduction: End stage renal disease (ESRD) is one of the main health problems in El Minia Governorate Currently, hemodialysis (HD) represents the main mode for treatment of ESRD in El Minia Governorate. El Minia Governorate consists of 9 districts and total population of 4.6 millions. The aim of this study: is to describe the prevalence rate and etiology of ESRD in patients under Renal Replacement Therapy (RRT) in El Minia Governorate during the year 2005 and risk factors for cardiovascular disease in this group of patients. **Material and Method:** Patients of ESRD were interviewed and questionnaires were filled out by the investigators. The questionnair included personal data, past history of relevant diseases, renal biopsy results, ultrasonography, dialysis frequency, lipid profile, ECG, Echocardiography and other data investigating the cause of ESRD and the causes of death. **Results:** This study included 614 patients, that is 51 % of the estimated total number of patients treated by RRT in El-Minia governorate. The prevalence of ESRD in El- Minia governorate is 260/ per million population (PMP). Most patients are treated by hemodialysis (HD) (97.2 %) while only 2.8% are treated by either peritoneal dialysis or renal transplantation. The etiology of ESRD was unknown in 28% of cases while hypertension was responsible for 20.7% of cases, obstructive uropathy 12.7%, chronic glomerulonephritis 10.4%, analgesic nephropathy 6% chronic pyelonephritis 5.8%, and diabetic nephropathy 5%. Other causes such as gouty nephropathy, collagen diseases, toxemia of pregnancy and lupus nephritis constituted 7% of cases. The prevalence of ischemic heart disease was 16.5%, congestive heart failure 28% Cerebrovascular accidents 5%, the death rate among HD patients during this year was 210/1000. **Recommendation:** Education program for nephrologists and practitioners should be strengthened with special emphasis on etiological factors leading to ESRD , blood pressure control with focus on systolic pressure appears to be an important strategy to improve outcomes in HD patients, Attempts to establish a program for renal Transplantation should be encouraged.

Introduction

End stage renal disease (ESRD) is one of the main health problems in El Minia Governorate Currently, hemodialysis (HD) represents the main mode for treatment of (ESRD) in El Minia Governorate. El Minia Governorate consists of 9 districts and total population of 4.6 millions. The epidemiology of ESRD has been examined once in 2002 by (El Minshawy *et al.*, 2002) however there is no reliable data neither on Cardiovascular disease nor on its risk factors in El Minia Governorate hemodialysis patients.

In Egypt the prevalence of dialysis patients is presumed to have increased from

10 per million in 1974 to about 165 per million in 1995 (Afifi and Abd El Karim 1999). In the five North African countries the incidence of renal disease is much higher than that in the west yet the prevalence is relatively lower which mirrors the adequacy of medical care facilities (Barsoum, 2003).

Despite the aggressive treatment of diabetes mellitus, hypertension and hyperlipidemia the incidence and prevalence rates of ESRD continues to increase world wide (Satko *et al.*, 2005)

Chronic kidney disease (CKD) is becoming an independent risk factor for

cardiovascular disease. The American heart association recommended that patients with CKD can be considered as members of the highest risk group for subsequent cardiovascular events (Coresh *et al.*, 2004)

Myocardial infarction and other cardiovascular events constitute the leading causes of death in dialysis dependent ESRD patients. Left ventricular hypertrophy (LVH) has been known as an independent risk factor for cardiovascular death in both dialysis and general population (Kan and Yang 2004). Moreover cardiovascular diseases specially LVH are the major cause of mortality in uremic patients treated by hemodialysis. Progressive renal disease is associated with increased risk of cardiovascular death specially sudden death (Stewart *et al.*, 2005)

One potentially modifiable risk factor for CVD in CKD is dyslipidemia but observational studies have noted that a reverse epidemiology in patients with CKD as that low total cholesterol levels are associated with higher mortality rate (Weiner and Sarnak, 2004)

Aim of the work

The aim of this study is to describe the prevalence, rate and etiology of ESRD in patients under Renal Replacement Therapy in El Minia Governorate during the year 2005 and risk factors of cardiovascular disease in this group of patients.

Material and Methods

Egypt is formed of 26 governorates, El Minia governorate is one of upper Egypt governorates. El Minia governorate is formed of 9 districts. Patients of ESRD were interviewed and questionnaires were filled by the investigators. The questionnaire included personal data, age, sex, residence, occupation, special habits and past history of relevant diseases. Renal biopsy results, ultrasonography, dialysis frequency and other data investigating the cause of ESRD as well as the causes of death were also investigated. All patients underwent complete clinical examination

with special emphasis on cardiac examination. Echocardiography was used for routine analysis and assessment of left ventricular hypertrophy and diastolic dysfunction. Collected data were manipulated using an IBM compatible PC and SPSS program for windows release 10 for statistical analysis.

Results

In El-Minia governorate there are 19 dialysis centers with variable capacities , some of them were reluctant to cooperate in this study and refused to allow the investigators to meet the patients. This study included 614 patients, that is 51% of the estimated total number of dialysis patients in El-Minia governorate according to the records of Ministry Health. The estimated prevalence of ESRD in El- Minia governorate at the time of the study was 260/ million population per million population (PMP).

Males were more than females in this study (64% and 36% respectively), while patients lived in the rural areas were more than those lived in urban areas (56% and 44% respectively). The mean age of the patients was 44.6 ± 13.7 years, ranged from 13 to 81 years old. Furthermore, the duration of the dialysis was 60 ± 45 months ranged from 1-306 months and all patients were dialyzed 3 times per week.

Echocardiography revealed that LVH was present in 66% and diastolic dysfunction was present in 76% of patients. Plain X ray chest PA view shows cardiomegaly in 30% of patients. Resting ECG was normal in 30% of patients and illustrated LVH in 37% of patients, Ischemic changes in 16.5% of patients, low voltage in 10% of patients and Arrhythmia in 6.5% of patients.

The prevalence of dyslipidemia was 21% in HD patients and only 30% of them were under treatment with drug therapy.

Table (1) shows the distribution of the patients among the 9 districts of El-Minia governorate. About 44% of patients were from El-Minia city. The prevalence of ESRD showed no significant sex difference among most of districts. Females were

more than males in El-Minia city and Samalout, while males were more than females in Bany Mazar.

The etiology of ESRD was unknown in 28% of cases while hypertension was responsible for 20.7% of cases, obstructive uropathy 12.7%, Bilhazial stricture obstructive uropathy 4.4 %, chronic glomerulonephritis 10.4%, analgesic nephropathy 6% Chronic pyelonephritis 5.8% and diabetic nephropathy 5%. Other causes such as gouty nephropathy, collagen diseases, toxemia of pregnancy and lupus nephritis constituted 7% of cases. The prevalence of hypertension and analgesic nephropathy was significantly higher in females than males, while the prevalence of obstructive uropathy due to schistosomiasis and those due to unknown causes were significantly higher in males than females (Table 2). ESRD due to diabetic nephropathy was significantly higher in urban (7.8%) than in

rural areas (2.9%), while those due to obstructive uropathy caused by schistosomiasis was significantly higher in rural (7%) than in urban areas (1.1%). Other causes of ESRD showed no significant differences between rural and urban areas (Table 3).

Figure (1) shows that 28.3% of patients were housewives, 23.3% were farmers, 17.4% were clerk, 17.1% had no job, while 13.8% of patients were manual workers. Table (4) reveals that hypertension, chronic pyelonephritis and analgesic nephropathy were common among housewives, while chronic glomerulonephritis, obstructive uropathy and obstructive uropathy due to schistosomiasis were common among farmers. In addition, it was found that diabetic nephropathy was common among clerk patients.

Table (1): Prevalence of ESRD among males and females in different districts of El-Minia governorate

District	Males	Females	P	Total
Edwa	8 (2%)	4 (1.8%)	0.43	12 (2%)
Maghagha	25 (6.4%)	8 (3.6%)	0.07	33 (5.4%)
Bany Mazar	30 (7.6%)	7 (3.2%)	0.01	37 (6%)
Mattay	9 (2.3%)	2 (0.9%)	0.12	11 (1.8%)
Samalout	80 (2.4%)	42 (19%)	0.0001	122 (19.9%)
El-Minia	150 (38.2%)	120 (54.3%)	0.0001	270 (44%)
Abou Korkas	27 (6.9%)	10 (4.5%)	0.11	37 (6%)
Malawy	38 (9.7%)	17 (7.7%)	0.20	55 (9%)
Deir Mawas	26 (6.6%)	11 (5%)	0.21	37 (6%)
Total	393 (100%)	221 (100%)	-	614 (100)

Table (2): Comparison between males and females regarding the etiology of the ESRD

Etiology	Males	Females	P	Total
Hypertension	69 (17.6%)	58 (26.2%)	0.005	127 (20.7%)
Pyelonephritis	21 (5.3%)	14 (6.3%)	0.32	35 (5.7%)
Glomerulonephritis	44 (11.2%)	20 (9%)	0.21	64 (10.4%)
Diabetic nephropathy	18 (4.6%)	13 (5.9%)	0.24	31 (5%)
Schistosomiasis	25 (6.4%)	2 (0.9%)	0.001	27 (4.4%)
Obstructive uropathy	52 (13.2%)	26 (11.8%)	0.33	78 (12.7%)
Analgesic nephropathy	19 (4.8%)	18 (8.1%)	0.04	37 (6%)
Others	17 (4.3%)	26 (11.8%)	0.005	43 (7%)
Unknown	128 (32.6%)	44 (19.9%)	0.001	172 (28%)
Total	393 (100%)	221 (100%)	-	614 (100)

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Table (3): Comparison between rural and urban areas regarding the etiology of the ESRD

Etiology	Rural	Urban	P	Total
Hypertension	65 (18.9%)	62 (23%)	0.13	127 (20.7%)
Pyelonephritis	19 (5.5%)	16 (5.9%)	0.41	35 (5.7%)
Glomerulonephritis	31 (9%)	33 (12.2%)	0.11	64 (10.4%)
Diabetic nephropathy	10 (2.9%)	21 (7.8%)	0.002	31 (5%)
Schistosomiasis	24 (7%)	3 (1.1%)	0.001	27 (4.4%)
Obstructive uropathy	49 (14.2%)	29 (10.7%)	0.10	78 (12.7%)
Analgesic nephropathy	19 (5.5%)	18 (6.7%)	0.27	37 (6%)
Others	14 (4.1%)	29 (10.7%)	0.001	43 (7%)
Unknown	113 (32.8%)	59 (21.9%)	0.001	172 (28%)
Total	344 (100%)	270 (100%)	-	614 (100)

Table 4: Relationship between etiology of ESRD and occupation of the patients

Etiology	Farmer	Clerk	No job	Housewife	Manual	Total
Hypertension	26 (20.5%)	16 (12.6%)	20 (15.8%)	47 (37%)	18 (14.2%)	127 (100%)
Pyelonephritis	6 (17.1%)	6 (17.1%)	7 (20%)	11 (31.4%)	5 (14.3%)	35 (100%)
Glomerulonephritis	16 (25%)	13 (20.3%)	9 (14.1%)	12 (18.8%)	14 (21.9%)	64 (100%)
Diabetic nephropathy	4 (12.9%)	12 (38.7%)	0 (0%)	11 (35.5%)	4 (12.9%)	31 (100%)
Schistosomiasis	11 (40.7%)	4 (14.8%)	5 (18.5%)	2 (7.4%)	5 (18.5%)	27 (100%)
Obstructive uropathy	24 (30.8%)	8 (10.3%)	16 (20.5%)	20 (25.6%)	10 (12.8%)	78 (100%)
Analgesic Nephropathy	9 (24.3%)	4 (10.8%)	2 (5.4%)	14 (37.8%)	8 (21.6%)	37 (100%)
Others	2 (4.7%)	8 (18.6%)	7 (16.3%)	21 (48.8%)	5 (11.6%)	43 (100%)
Unknown	45 (26.2%)	36 (20.9%)	39 (22.6%)	36 (20.9%)	16 (9.3%)	172 (100%)
Total	143 (23.3%)	107 (17.4%)	105 (17.1%)	174 (28.3%)	85 (13.8%)	614 (100%)

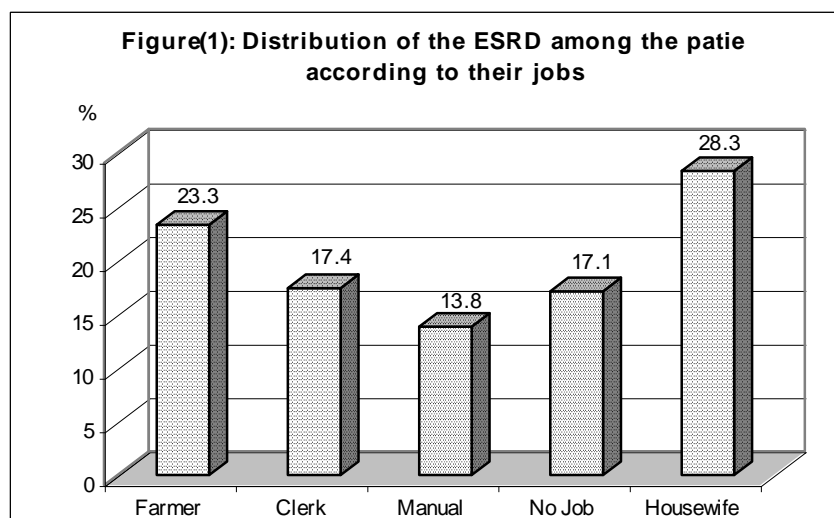


Figure 2: Prevalence of dyslipedemia in patients with ESRD

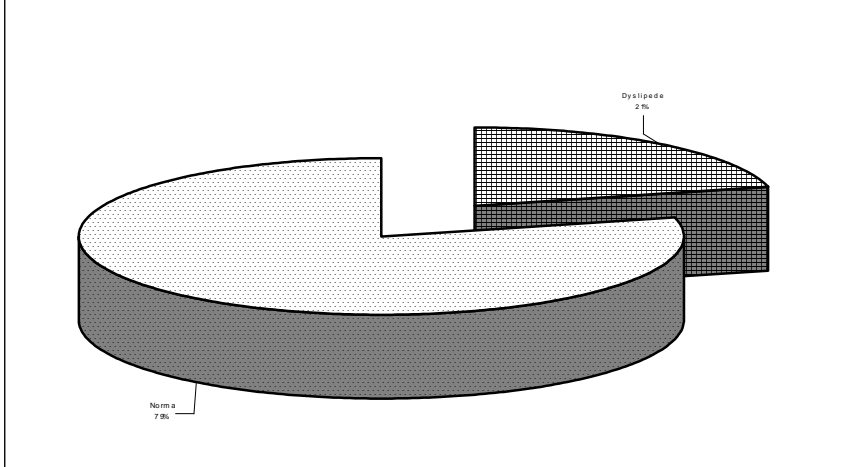


Figure 3: Resting ECG finding among patients with ESRD

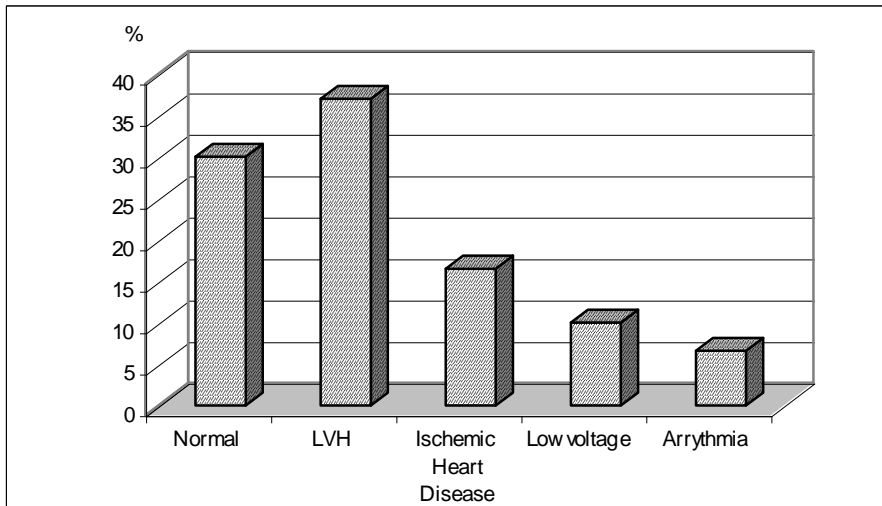
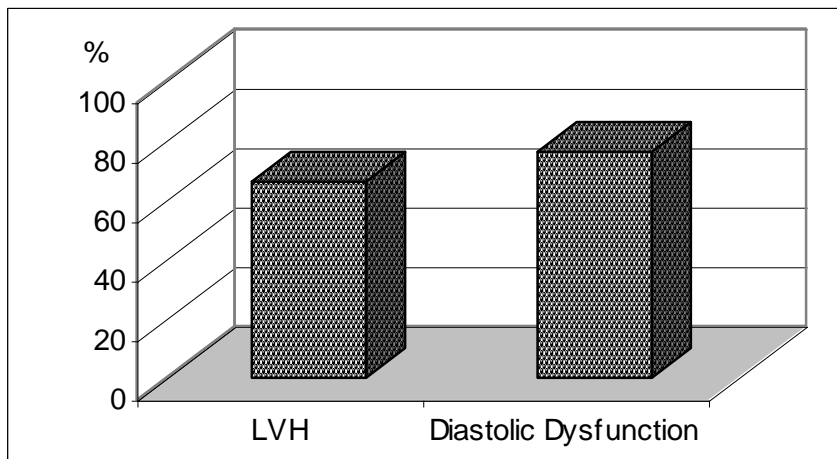


Figure 4: Echocardiographic findings among patients with ESRD



Discussion

The prevalence rate of ESRD during 2005 is 260 PMP, While it was 250 PMP during the year 2002 (El Minshawy *et al.*, 2002) and 225 PMP all over Egypt (Afifi and Abd El Kraim, 1999) in Brazil it is 390 PMP (Oliveira *et al.*, 2005) and in Yemen it is 320 PMP (Al-Rohani, 2004). In England the prevalence of RRT increased from 175 PMP in 1982 to 626 PMP in 2002 (Feest *et al.*, 2005) In Sweden the prevalence of patients on dialysis and transplantation being approximately 750 PMP (Schon *et al.*, 2004) The difference in prevalence rate between different countries is attributed to many factors and a higher prevalence rate correlates positively with gross national products (Brunner *et al.*, 1989)

The low rate of performing renal biopsy for patients before ESRD 2.6% reflects the need for changing education and training programs for nephrologists to early detection and management of renal diseases that may be complicated with renal failure.

The results of the present study illustrated that the etiology of ESRD was unknown in 28 % of cases. Previous report by (El Minshawy *et al.*, 2002) reported that unknown etiology of ESRD in El Minia Governorate during the year 2002 was 32.9 % these high figures may be due to lack of awareness of the treating physicians about the proper time of referring patients to nephrology centers as they refer the patients after their uremic state becomes very advanced.

This is in agreement with (Frassinetti *et al.*, 2000) who found that 24% of his patients with uncertain etiology. Avoran *et al.*, 2002 concluded that for patients with long standing renal disease, earlier consultation with nephrologist is associated with lower mortality in the first year of dialysis, similarly Stack, 2003 concluded that late nephrology referral is associated with greater death risk in new patients of ESRD and more frequent pre ESRD care can increase survival benefits.

In this study hypertensive nephrosclerosis was responsible for 20.7% of cases of ESRD in El Minia Governorate during the

year 2005 while it was responsible for 16.5 of cases of ESRD in El Minia governorate during the year 2002 (El Minshawy *et al.*, 2002). Similarly (Afifi and Abd El Kraim, 1999) reported that hypertension is responsible for 29.7 % of cases of ESRD in Cairo, 28.9 % in lower Egypt governorates, 25 % in upper Egypt governorate, 27.3 % in Suez Canal governorate, 26.5 % in border governorates. However (Frassinetti, *et al.*, 2000)¹⁴ found that hypertension constitute only 10 % of causes of ESRD in black patients.

(Lea and Nicholas 2002) reported that hypertension and diabetes mellitus are the key risk factor for kidney disease which are both becoming prevalent in USA.

Obstructive uropathy as a cause of ESRD in El Minia governorate is 12.7% while it was 9.6 % during the year 2002 (El Minshawy *et al.*, 2002). Obstructive uropathy due to schistosomiasis (caused by schistosoma hematobium) is 4.4% while it was responsible for 7.2 % of ESRD during the year 2002 One explanation of the decreasing prevalence of the urinary schistosomiasis (transmitted via the snail *bulinus truncatus*) is the success in the preventive programs against schistosomiasis carried out by Ministry of health, therefore these programs should be continued.

(Afifi and Abd El Kraim, 1999) reported that schistosomal obstructive uropathy is responsible for ESRD by 3.9 % in Cairo, 6.6 % in lower Egypt governorates, zero % in Canal governorates and 1.5 % in border line governorates.

Results of the current study illustrated that chronic glomerulonephritis constitute 10.4 % of causes of ESRD in El Minia governorate while it was 6 % during the year 2002 but (Frassinetti, *et al.*, 2000) found that glomerulonephritis is responsible for 20 % of ESRD in the black patients. This discrepancy between the two results may be due to that his study was concerned with black population only.

Diabetic nephropathy is responsible for only 5 % of causes of ESRD in El Minia governorate while it was 8.4 %

during the year 2002. (Afifi and Abd El kraim 1999) reported that it is responsible for 12.5 % in Cairo, 6.4 % in lower Egypt governorates 5.2 % in upper Egypt governorates, 10.7 % in Canal governorates, 11.8 % in border line governorates. (Coresh *et al.*, 2003) reported that hypertension and diabetes Mellitus are a key predictor of CKD. (Letourneau *et al.*, 2003) found that in 37 % of elderly patients on HD were diabetics. (Frassinetti, *et al.*, 2000) reported that diabetic nephropathy is responsible for 38 % of ESRD. We believe that the cause of low rate of diabetic nephropathy as a cause of ESRD in El Minia Governorate is due to that the Diabetic patients die from other complications of diabetes Mellitus before they develop ESRD

Fifty six percent of the patients are living in rural areas whereas 44% are urban residents Males constituted 64 % while females were 36% of the dialysis patients while during the year 2002 patients who were living in rural areas constituted 74.6% and those who were living in urban area constituted 25.4% males constituted 62.9 % while females were 37.1%.

(Cass *et al.*, 2001) reported that ESRD incidence among indigeous Australian is high in remote regions where it is up to 30 times the national incidence for all Australians. In urban regions the incidence is much lower but remains significantly higher than the national incidence. Forty eight percent of indigenous ESRD patients come from regions without dialysis or transplant facilities and 16.3 % from regions with satell dialysis facilities, (Brameld *et al.*, 1999) found that rates of renal failure were 15 times greater in aboriginal population than non aborigines.

Results of the current study illustrated that hypertension is highly prevelant among HD patients 50% this is in agreement with (Vukusich *et al.*, 2002) who concluded that hypertension is highly prevalent among HD patients but they do not determine if it is the cause of ESRD or not. Also (Otero *et al.*, 2005) reported that prevalence of hypertension as a risk factor for cardiovascular disease was 31.5%. and (Portoles *et al.*, 2005) who found that the prevalence of

hypertension in hemodialysis patients was 75.8%

Our results illustrate that left ventricular hypertrophy and diastolic dysfunction were prevalent among HD patients 66 % and 76% respectively this is in agreement with (Birchem *et al.*, 2005) who reported that hypertension in hemodialysis patients is a risk factor for left ventricular hypertrophy , diastolic dysfunction and congestive heart failure , good blood pressure control may promote its regression we found that the prevalence of dyslipedemia is 21 % in hemodialysis patients only 30 % of them under treatment of dyslipedemia with drug therapy (Portoles *et al.*, 2005) found the prevalence of dyslipedemia 34.1% in hemodialysis patients only 69.5% of them under drug therapy. Similarly (Otero *et al.*, 2005) reported that the prevalence of dyslipedemia is 21.9%

The mean age of ESRD patients was 44.6±13.7 years. The mean age of ESRD patients in El Minia governorate is lower than that of latin Amreican countries which is 50.5±10.9 years (Mazzuchhi *et al.*, 1997) the younger the age the more the social problems as these patients are in the productive and creative peroid of life

For the treatment of anemia 50% of patients received blood transfusion while only 14 % received erythropoetin the low number of patients trated by erythropoetin is related to its cost

HbsAg was postive in 3.5 % and did not correlate with blood transfusion. On the other hand HCV antibodies were positive in 52 % and significantly correlated with blood transfusion ($p < 0.05$). The high prevalence of HCV antibodies has drawn attention for better control of blood screening and the need to increse iron and erythro-poetin among dialysis patients insteated of blood transfusion.

The rate of renal transplantation is 13/1000 dialysis patients / year. All kidneys came from living donors. This rate is lower than other Egyptian governorates which is 32/1000 dialysis patients /year (Afifi and Abd El Karim, 1999)

The low transplantation rate is due to absence of specialized transplantation

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centers in El Minia governorate and those patients who treated by renal transplantation are treated in specialized centers in the other governorate although they are inhabitant in El Minia Governorate Attempts to establish a program for renal transplantation in El Minia governorate are undergoing although facing many obstacles.

The number of deaths among HD patients in 2005 is 210/1000 dialysis patients in order to accurately calculate the mortality rate, follow up surveys overcoming years are needed.

In our study causes of death were 53 % due to cardiovascular diseases and 14 % were due to cerebrovascular accidents these results were similar to the results of (Kessler, 2002) who found that cardiovascular disease is the leading cause of death in patients with ESRD and cardiovascular mortality is 10 – 30 fold higher in ESRF patients than the general population.

Also our results are in agreement with (McDonald *et al.*, 2002) who found that cardiac and infective causes are the predominant causes of death among dialysis patients and (Bellorin *et al.*, 2002) who reported that cardiovascular causes are the primary causes of death (39.5%) of HD patients in Venezuela.

Recommendations

Education program for Nephrologists and practitioners should be strengthened with special emphasis on etiological factors leading to ESRD , blood pressure control with focus on systolic pressure appears to be an important strategy to improve outcomes in HD patients, Attempts to establish a program for renal Transplantation should be encouraged.

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العلاج الإحلالى للفشل الكلوى وزيادة مخاطر الإصابة
بأمراض القلب والجهاز الدورى فى محافظة المنيا بصعيد مصر
أسامة المنشاوى* و عماد جرجس كامل**
من أقسام الباطنة العامة* والصحة العامة** بكلية الطب - جامعة المنيا

تقع محافظة المنيا فى صعيد مصر ويسكنها حوالى 4.6 مليون نسمة موزعين فى 9 مراكز ويشكل الفشل الكلوى فى مرحلته النهائية سببا من الأسباب المهمة للوفيات بها. وكان الهدف من هذا البحث هو دراسة أسباب إنتشار الفشل الكلوى فى محافظة المنيا وكذلك دراسة عوامل الخطورة التى تؤدى إلى الإصابة لأمراض القلب والجهاز الدورى وقد أشتمل البحث على عدد 614 مريض تم ملئ استمارة الاستبيان لكل منهم وتشمل البيانات الشخصية والتاريخ المرضى ونتائج عينة الكلى والموجات الصوتية للبطن والموجات الصوتية للقلب ورسم القلب ونسبة الكلسترول والدهون الثلاثية وأسباب الوفيات فى حالة حدوثها وجاءت نتائج البحث كالاتى

يعالج 97.2% من المرضى بالإستصفاء الدموى بينما يعالج 2.8% بالإستصفاء البريتونى أو زرع الكلى وكانت أسباب الفشل الكلوى فى مرحلته النهائية كالاتى :-

- الحالات مجهولة السبب 28%
- إرتفاع ضغط الدم 20.7%
- إنسداد مجرى الحاليين 12.7%
- التهاب كبيبات المزمن 10.4%
- المسكنات بدون إشراف طبي 6%
- إعتلال الكلى السكرى 5%
- البلهارسيا 4.4%
- التهاب حوض الكلى المزمن 2.2%
- بينما تشكل باقى الأسباب 7%

** وكان معدل إنتشار قصور الشريان التاجى بين المرضى 16.5% ، وهبوط القلب الإحتقانى 28% وكان معدل حدوث الوفيات بين مرضى الإستصفاء الدموى 210 / 1000 مريض سنويا وقد خلص البحث إل ضرورة التوسع فى برامج تدريب أطباء الكلى على معالجة أسباب الفشل الكلوى مبكراً والسيطرة على إرتفاع ضغط الدم المنتشر بين المرضى وإنشاء برنامج لزرع الكلى فى محافظة المنيا .