Results

Table (1) showed descriptive data for all studied patients:

- **Control group (25 patients):** all patients had normal liver and spleen. negative for HCV –RNA before and after Tx. Eleven patients (44%) had no rejection. four (16%) had one rejection episode. four had two rejections. five (20%) had three rejection episodes and one patient (4%) had four rejection episodes.
- **Hepatitis C + interferon group (16 patients):** 9 patients (56.3%) had normal liver and 7 patients (43.7%) had enlarged liver. Also. 13 patients had normal spleen and 3 patients had splenomegaly, 4 patients (25%) did not respond to interferon therapy (positive for HCV – RNA by PCR) but 6 patients (37.5%) were positive for HCV – RNA by PCR at the end of the study (i.e reappearance of viremia in 2 negative cases). Eight patients (50%) had no rejection, 5 patients (31.3%) had one rejection, 2 patients (12.5%) had 2 rejection episodes. and 1 patient (6.3%) had 3 rejection episodes.
- **Hepatitis C group (12 patients):** 11 patients (91.7%) had normal liver, 1 patient (8.3%) had enlarged liver and liver biopsy was done to 4 patients only and revealed CPH. All patients had normal spleen. Five patients (41.7%) were negative for HCV- RNA by PCR before kidney Tx while 7 patients (58.3%) were positive. However, after kidney Tx, 4 patients (33.3%) were negative and 8 patients (66.7%) became positive for HCV RNA (i.e conversion of 4 PCR negative cases to PCR positive). No rejection in 8 patients (66.7%). 1 rejection in 2 patients (16.7%). 2 rejections in 1 patient (8.3%) and 3 rejections in 1 patient (8.3%).
- **Hepatitis C and hepatitis B group (5 patients):** 3 patients (60%) had normal liver while 2 patients (40%) had hepatomegaly and liver biopsy was done to 4 patients and revealed CPH in them. Four patients (80%) had normal spleen while 1 patient (20%) had splenomegaly. Before and after kidney Tx. 2 patients (40%) were HCV-RNA negatives (by PCR) and 3 patients (60%) were HCV-RNA positive (by PCR). One patient (20%) had

no rejection, 3 patients (60%) had one rejection, and 1 patient had 4 rejection episodes.

- **Hepatitis C and schistosomiasis group (8 patients):** 5 patients (62.5%) had normal liver and 3 patients (37.5%) had hepatomegaly and liver biopsy was done in 2 patients and revealed CPH. Normal spleen was found in 6 patients (75%) and splenomegaly in 2 patients (25%). HCV-RNA (by PCR) was negative in 2 patients (25%) and positive in 6 patients (75%) before and after kidney Tx.
- **Schistosomiasis group (9 patients):** 3 patients (33.3%) had normal liver and 6 patients (66.7%) had enlarged liver while 7 patients (77.8%) had normal spleen and 2 patients (22.2%) had enlarged spleen. All patients were negative for HCV. Four patients (44.4%) had no rejection. 3 patients (33.3%) had 1 rejection and 2 patients (22.2%) had 2 rejection episodes.

Table (2) showed a comparison of liver function between control and other groups before kidney transplantation:

- **HCV+IFN group**: non-significant lower albumin. mildly significant lower bilirubin (P=0.02), non-significantly higher ALT, alkaline phosphatase and prothrombin activity and mildly significant higher AST level than control group (P=0.04).
- **HCV group**: non-significant lower serum albumin. non-significant higher bilirubin, alkaline phosphatase, and prothrombin activity and highly significant higher ALT (P=0.002) and mildly significant higher AST (P=0.01).
- **HCV+HBV group**: non-significant lower serum albumin. highly significant higher bilirubin, ALT and AST (P<0.006) and mildly significant higher alkaline phosphatase and prothrombin activity (P<0.05) than the control group.
- **HCV + schistosomiasis group**: highly significant higher serum albumin (P=0.002), non-significant higher bilirubin, ALT, AST and prothrombin activity but mildly significant higher alkaline phosphatase (P=0.04).

- **Schistosomiasis group**: non-significant lower serum albumin, AST, and alkaline phosphatase. non-significantly higher bilirubin and ALT but mildly significant higher prothrombin activity (P=0.03).

Table (3) showed a comparison of serum creatinine in control versus other groups during the first two months after kidney transplantation:

- **HCV+IFN group**: non significant difference in serum creatinine (P>0.05)
- **HCV group**: non-significant higher serum creatinine in the 1st, 2nd, 3rd, 4th, 5th, 6th, and 8th weeks but mildly significant higher level in the 7th week (P=0.03).
- **HCV+HBV group**: non-significant higher serum creatinine in the first 8 weeks.
- **HCV+ schistosomiasis group**: high serum creatinine was noticed even twice the control group but non-significant in the 2nd, 3rd, 4th, 5th, 6th, and 8th week and mildly significant higher in 1st and 7th weeks (P=0.04).
- **Schistosomiasis group**: non significant difference in serum creatinine (P>0.05)

Table (4) showed a comparison between control versus other groups in the 3rd month after kidney transplantation

- **HCV+IFN group**: non-significant difference in liver function, and non-significant lower serum creatinine than the control
- **HCV group**: highly significant lower serum albumin and prothrombin activity (P=0.008 and P=0.0 respectively), non-significantly higher serum bilirubin, ALT, AST, alkaline phosphatase as well as serum creatinine (P>0.05) than control.
- **HCV+HBV group**: non-significant lower serum albumin, non-significant higher bilirubin and ALT, mildly significant higher AST and alkaline phosphatase (P=0.01) and highly significant lower prothrombin activity (P=0.0). However, serum creatinine was non-significantly higher than the control.

- **HCV+schistosomiasis group**: mildly significant lower serum albumin (P=0.02). non-significant lower bilirubin. ALT. AST and alkaline phosphatase, and highly significant lower prothrombin activity (P=0.0). High serum creatinine was noticed even twice the control group but non-significant.
- **Schistosomiasis group**: non-significant difference in liver function and serum creatinine.

Table (5) showed a comparison of serum creatinine in control versus other groups from 4^{th} to 12^{th} months after kidney transplantation:

- **HCV+IFN group**: non-significant difference in serum creatinine than control group.
- **HCV group**: non-significant higher serum creatinine in 4^{th}. 5^{th}. 6^{th}. 7^{th}. and 8^{th} months and non-significantly lower in 9^{th}. 10^{th}. 11^{th}. and 12^{th} months than control group (P>0.05).
- **HCV+HBV group**: non-significant higher serum creatinine in 4^{th}. 5^{th}. 6^{th}. 7^{th}. 8^{th} and 9^{th} months and non-significantly lower in 10^{th}. 11^{th}. and 12^{th} months than control group (P>0.05).
- **HCV+schistosomiasis group**: mildly significant higher serum creatinine in 4^{th}. 5^{th}. and 9^{th} months (P<0.05). highly significant higher serum creatinine in 6^{th}. 7^{th}. and 8^{th} months (P=0.005.P=0.002 and P=0.009) and non-significant higher in 10^{th}. 11^{th}. and 12^{th} months.
- **Schistosomiasis group**: non-significantly lower serum creatinine than control group.

Table (6) showed a comparison of liver function between control and other groups in the 10^{th} and 16^{th} months after kidney transplantation:

- **HCV+IFN group**: non-significant difference than control group.

- **HCV group**: non-significant difference than control group except highly significant lower prothrombin activity in 10^{th} month than control group (P=0.007).
- **HCV+HBV group**: non-significant difference than control group except highly significant lower prothrombin activity in 10^{th} and 16^{th} months than control group (P<0.05).
- **HCV+ schistosomiasis group**: non-significant difference than control group except highly significant lower prothrombin activity in 10^{th} and 16^{th} months than control group (P<0.05).
- **Schistosomiasis group**: non-significant difference than control group except mildly significant higher serum bilirubin and lower alkaline phosphatase in 16^{th} month than control group (P<0.05).

Table (7) showed a comparison of serum creatinine in control versus other groups from 13^{th} to 18^{th} months after kidney transplantation:

- **HCV+IFN group**: non-significantly lower serum creatinine and number of rejection episodes than control group.
- **HCV group**: non-significantly lower serum creatinine and number of rejection episodes than control group.
- **HCV+HBV group** : non-significantly lower serum creatinine in 13^{th}, 16^{th}, 17^{th}, and 18^{th} months as well as non-significantly higher serum creatinine in 14^{th} and 15^{th} months and number of rejection episodes than control group
- **HCV+schistosomiasis group**: non-significantly higher serum creatinine and number of rejection episodes than control group.
- **Schistosomiasis group**: non-significantly lower serum creatinine and number of rejection episodes than control group

Table (8) showed a comparison between HCV+IFN group and other groups before kidney transplantation

- **HCV group**: non-significant lower serum albumin, AST, alkaline phosphatase, and prothrombin activity (P>0.05) and mildly significant

higher serum bilirubin (P=0.02), and non-significantly higher ALT than HCV+IFN group.

- **HCV+HBV group**: non-significant lower serum albumin, highly significant higher bilirubin (P=0.003), non-significant higher ALT, AST, and alkaline phosphatase (P>0.05) and mildly significant lower prothrombin activity than HCV+IFN group (P=0.04).
- **HCV+ schistosomiasis group**: highly significant lower serum albumin (P=0.005), mildly significant higher serum bilirubin (P=0.02), non-significant higher ALT, lower AST, alkaline phosphatase and prothrombin activity (P>0.05).
- **Schistosomiasis group**: non-significant lower serum albumin, ALT, alkaline phosphatase and prothrombin activity and non-significant higher serum bilirubin (P>0.05), and mildly significant lower AST than HCV+IFN group (P=0.03).

Table (9) showed a comparison of serum creatinine in HCV+IFN group versus other groups during the first two months after kidney transplantation:

- **HCV group**: non-significant higher serum creatinine in the 1st, 2nd, 3rd, 4th, 5th, 6th, and 7th months but mildly significant higher serum creatinine in the 8th week than HCV+IFN group (P=0.03).
- **HCV+HBV group**: non-significant higher serum creatinine than HCV+IFN group.
- **HCV+schistosomiasis group**: non-significant higher serum creatinine than HCV+IFN group.
- **Schistosomiasis group**: non-significant lower serum creatinine than HCV+IFN group.

Table (10) showed a comparison between HCV+IFN group versus other groups in the 3rd month after kidney transplantation:

- **HCV group**: mildly significant lower serum albumin (P=0.01), non-significant higher bilirubin, highly significant higher ALT and AST

(P=0.001), mildly significant lower prothrombin activity (P=0.02) and non-significant lower alkaline phosphatase than HCV+IFN group. Also, highly significant elevation of serum creatinine in the 1st week (P=0.004), non-significant elevation in 2nd and 3rd weeks (P>0.05) and mildly significant elevation of serum creatinine in the 4th week (P=0.04).

- **HCV+HBV group**: non-significant lower serum albumin, non-significant higher bilirubin and alkaline phosphatase, highly significant higher ALT (P=0.006) and AST (P=0.002) and mildly significant lower prothrombin activity (P=0.02) than HCV+IFN group. Moreover, mildly significant higher serum creatinine in the 1st week (P=0.04) and non-significant elevation in other weeks than HCV+IFN group.
- **HCV+schistosomiasis group**: non-significant lower serum albumin and bilirubin, non-significant higher ALT, AST and alkaline phosphatase, and non-significant lower prothrombin activity than HCV+IFN group. However, serum creatinine was non-significantly elevated (P>0.05).
- **Schistosomiasis group**: mildly significant lower serum albumin (P=0.01) and prothrombin activity (P=0.03), non-significant higher bilirubin and ALT, and non-significant lower AST and alkaline phosphatase than HCV+IFN group. However, serum creatinine was non-significantly different from HCV+IFN group (P>0.05).

Table (11) showed a comparison of serum creatinine in HCV+IFN group versus other groups from 4th to 12th months after kidney transplantation:

- **HCV group**: serum creatinine was non-significantly higher from the 4th to the end of 9th month but non-significantly lower in 10th, 11th, and 12th months than HCV+IFN group.
- **HCV+HBV group**: serum creatinine was non-significantly higher during the whole period than HCV+IFN group.
- **HCV+schistosomiasis group**: serum creatinine was mildly significant higher in 4th, 5th, 8th, 9th, 11th, and 12th months (P<0.05) and highly

phosphatase (P<0.05) and non-significant higher ALT and prothrombin activity than HCV+IFN group.

Table (13) showed a comparison of serum creatinine in HCV+IFN group versus other groups from 13th to 18th months after kidney transplantation:

- **HCV group**: non-significant lower serum creatinine and number of rejections than HCV+IFN group.
- **HCV+HBV group**: non-significant higher serum creatinine and non-significant lower number of rejections than HCV+IFN group.
- **HCV+schistosomiasis group**: mildly significantly elevated serum creatinine in 13th month and total number of rejection episodes (P <0.05) but non-significant higher serum creatinine from 14th to the end of study than HCV+IFN group.
- **Schistosomiasis group**: non-significant difference in serum creatinine and number of rejections from HCV+IFN group.

Table (14) showed a comparison between HCV group and other groups before kidney transplantation

- **HCV+HBV group**: non-significant higher serum albumin. bilirubin. ALT. AST and alkaline phosphatase, and non-significant lower prothrombin activity than HCV group (P>0.05).
- **HCV+schistosomiasis group**: non-significant lower serum albumin, ALT, AST and prothrombin activity than HCV group (P>0.05). But. bilirubin and alkaline phosphatase were non-significantly elevated than HCV group.
- **Schistosomiasis group**: non-significant higher serum albumin. lower bilirubin, ALT, and alkaline phosphatase but highly significantly lower AST (P=0.004) and mildly significantly higher prothrombin activity than HCV group (P=0.03).

Table (15) showed a comparison of serum creatinine in HCV group versus other groups during the first two months after kidney transplantation:

- **HCV+HBV group**: non-significant lower serum creatinine in 1st, 2nd, and 6th weeks and non-significant higher levels in 3rd, 4th, 5th, 7th, and 8th weeks than HCV group.
- **HCV+schistosomiasis group**: non-significant higher serum creatinine in 1st, 2nd, 3rd, 4th, 5th, 6th, and 8th weeks and mildly significant higher serum creatinine in the 7th week than HCV group (P=0.04).
- **Schistosomiasis group**: mildly significant lower serum creatinine in 1st, and 8th weeks (P<0.05) and non-significantly lower in other weeks than HCV group.

Table (16) showed a comparison between HCV group versus other groups in the 3rd month after kidney transplantation:

- **HCV+HBV group**: non-significant higher liver function results than HCV group. Also, non-significant higher serum creatinine during the 4 weeks (P>0.05).
- **HCV+schistosomiasis group**: non-significant higher liver function results than HCV group. Also, non-significant higher serum creatinine during the 4 weeks (P>0.05).
- **Schistosomiasis group**: non-significant higher serum albumin, non-significant lower bilirubin, and alkaline phosphatase (P>0.05), highly significant lower ALT and AST and highly significant higher prothrombin activity than HCV group (P=0.009,P=0.00 and P=0.002 respectively) during the 4 weeks (P>0.05).

Table (17) showed a comparison of serum creatinine in HCV group versus other groups from 4th to 12th months after kidney transplantation:

- **HCV+HBV group**: non-significant higher serum creatinine from the 4^{th} to 12^{th} month than HCV group.
- **HCV+schistosomiasis group**: non-significant higher serum creatinine in the 4^{th}, 5^{th}, 10^{th} and 12^{th} months than HCV group and mildly significant higher serum creatinine in 6^{th}, 7^{th} and 8^{th} months ($P<0.05$) and highly significant higher serum creatinine in 11^{th} month ($P=0.007$) than HCV group.
- **Schistosomiasis group**: non-significant difference in serum creatinine from the 4^{th} to 12^{th} month than HCV group.

Table (18) showed a comparison of liver function between HCV group and other groups in the 10^{th} and 16^{th} months after kidney transplantation:

- **HCV+HBV group**: non-significant difference in liver function tests than HCV group in 10^{th} and 16^{th} months.
- **HCV+schistosomiasis group**: non-significant difference in liver function tests than HCV group in 10^{th} and 16^{th} months.
- **Schistosomiasis**: non-significant higher serum albumin, lower bilirubin and ALT than HCV group but highly significant lower AST ($P=0.002$) and alkaline phosphatase ($P=0.004$) and highly significant higher prothrombin activity ($P=0.009$) than HCV group in 10^{th} month. Also, non-significant lower serum albumin, ALT, and AST as well as non-significant higher bilirubin than HCV group in 16^{th} month. Also, mildly significant lower alkaline phosphatase ($P=0.01$) and mildly significant higher prothrombin activity ($P=0.04$) than HCV group in 16^{th} month.

Table (19) showed a comparison of serum creatinine in HCV group versus other groups from 13^{th} to 18^{th} months after kidney transplantation:

- **HCV+HBV group**: non-significant higher serum creatinine and number of rejection episodes than HCV group.

- **HCV+schistosomiasis group**: mildly significant higher serum creatinine in the 13th month and number of rejection episodes than HCV group (P<0.05). Also, non-significant higher serum creatinine from the 14th to the 18th months than HCV group.
- **Schistosomiasis group**: non-significant higher serum creatinine and number of rejection episodes than HCV group.

Table (20) showed a comparison btween HCV+HBV group and other groups before kidney transplantation:

- **HCV+Schistosomiasis group**: non-significant lower serum albumin, bilirubin, ALT, AST, and alkaline phosphatase as well as non-significantly higher prothrombin activity than HCV +HBV group.
- **Schistosomiasis group**: non-significant higher serum albumin and non-significant lower serum bilirubin than HCV+HBV group. Also, mildly significant lower ALT and alkaline phosphatase (P<0.05), highly significant lower AST (P<0.005) and mildly significant higher prothrombin activity (P<0.05) than HCV+HBV group.

Table (21) showed a comparison of serum creatinine in HCV+HBV group versus other groups during the first two months after kidney transplantation:

- **HCV+schistosomiasis group**: non-significantly higher serum creatinine than HCV+HBV group.
- **Schistosomiasis group**: non-significantly lower serum creatinine from the 1st to 7th week, and mildly significant lower serum creatinine in the 8th week (P=0.04) than HCV+HBV group.

Table (22) showed a comparison between HCV+HBVgroup versus other groups in the 3rd month after kidney transplantation:

- **HCV+schistosomiasis group**: non-significant lower serum albumin, bilirubin, AST and alkaline phosphatase than HCV+HBV group with non-significant higher ALT and prothrombin activity than HCV+HBV group.

Also, serum creatinine was non-significantly elevated than HCV+HBV group.

- **Schistosomiasis group**: non-significant higher serum albumin and lower bilirubin and and alkaline phosphatase than HCV+HBV group. Also, mildly significantly lower serum ALT (P=0.02), highly significant lower AST and highly significant higher prothrombin activity (P<0.005) than HCV+HBV group.

Table (23) showed a comparison of serum creatinine in HCV+HBV group versus other groups from 4^{th} to 12^{th} months after kidney transplantation:

- **HCV+schistosomiasis group**: non-significantly higher serum creatinine from 4^{th} to 12^{th} months than HCV+HBV group.
- **Schistosomiasis group**: non-significantly lower serum creatinine from 4^{th} to 12^{th} months than HCV+HBV group.

Table (24) showed a comparison of liver function between HCV+HBV group and other groups in the 10^{th} and 16^{th} months after kidney transplantation:

- **HCV+schistosomiasis group**: non-significant lower serum albumin, AST, and prothrombin activity, as well as non-significant higher bilirubin, ALT and alkaline phosphatase in 10^{th} month than HCV+HBV group. Also, non-significant higher albumin, bilirubin, ALT, and alkaline phosphatase as well as non-significant lower AST and prothrombin activity in the 16^{th} month than HCV+HBV group (P>0.05).
- **Schistosomiasis group**: non-significant lower serum albumin and ALT, with mildly significantl lower AST, and alkaline phosphatase (P < 0.05), as well as non-significant higher bilirubin (P>0.05) and highly significant higher prothrombin activity (P = 0.007) in 10^{th} month than HCV+HBV group. However, in the 16^{th} month, non-significantly lower serum albumin, ALT and AST and non-significantly higher bilirubin than HCV+HBV group

(P>0.05) with mildly significant lower alkaline phosphatase (P=0.04) and higher prothrombin activity (P=0.02) than HCV+HBV group.

Table (25) showed a comparison of serum creatinine in HCV+HBV group versus other groups from 13th to 18th months after kidney transplantation:

- **HCV+schistosomiasis group**: non-significant higher serum creatinine and rejection episodes than HCV+HBV group.
- **Schistosomiasis group**: non-significant lower serum creatinine and rejection episodes than HCV+HBV group.

Table (26) showed a comparison btween HCV+schistosomiasis group and schistosomiasis group before kidney transplantation:

Mildly significant higher serum albumin and prothrombin activity (P<0.05) and non-significant lower bilirubin, ALT, AST, and alkaline phosphatse (P>0.05).

Table (27) showed a comparison of serum creatinine in HCV+schistosomiasis group versus schistosomiasis group during the first two months after kidney transplantation:

Mildly significant lower serum creatinine in the 1st, 2nd and 3rd weeks (P<0.05) and non-significant lower serum creatinine in 4th, 5th, 6th, 7th, and 8th weeks (P>0.05) than HCV+Schistosomiasis group.

Table (28) showed comparison between HCV+schistosomiasis group versus schistosomiasis group in the 3rd month after kidney transplantation:

Non-significant higher serum albumin, non-significant lower bilirubin, ALT, and alkaline phosphatase (P>0.05) and mildly significant lower AST (P<0.05) and highly significant higher prothrombin activity (P=0.004) than HCV+schistosomiasis group. Also, it showed non-significant lower serum creatinine than HCV+schistosomiasis group (P>0.05).

Table (29) showed a comparison of serum creatinine in HCV+ schistosomiasis group versus schistosomiasis group rom 4^{th} to 12^{th} months after kidney transplantation:

It showed non-significant lower serum creatinine in 4^{th}. 10^{th}. and 12^{th} months than HCV+schistosomiasis group (P>0.05) as well as mildly significant lower serum creatinine in 5^{th}. 8^{th}. 9^{th}. and 11^{th} months (P<0.05) but highly significant lower serum creatinine in 6^{th} (P=0.006) and 7^{th} (P=0.008) months than HCV+schistosomiasis group.

Table (30) showed a comparison of liver function between HCV+ schistosomiasis group and schistosomiasis group in the 10^{th} and 16^{th} months after kidney transplantation:

It showed non-significant higher serum albumin and bilirubin, non-significant lower ALT and AST (P>0.05). mildly significant higher prothrombin activity (P=0.04) and highly significant lower alkaline phosphatase (P=0.005) than HCV+schistosomiasis group in the 10^{th} month. While. in 16^{th} month. non-significant higher serum bilirubin. non-significant lower albumin, ALT and AST (P>0.05), mildly significant lower alkaline phosphatase (P=0.03) and mildly significant higher prothrombin activity (P=0.01) than HCV+schistosomiasis group.

Table (31) showed a comparison of serum creatinine in HCV+ schistosomiasis group versus schistosomiasis group from 13^{th} to 18^{th} months after kidney transplantation:

It showed non-significant lower serum creatinine and number of rejection episodes than HCV schistosomal group (P>0.05)

The following tables showed comparison between all patients negative for schistosomiasis versus schistosomiasis patients in all groups as well as HCV negative patients versus HCV positive patients among all groups.

Table (32) showed a comparison of non-schistosomal versus schistosomal patients and non-HCV versus HCV patients before kidney transplantation

- **Schistosomal patients**: mildly significant lower serum albumin (P=0.02). non-significant higher bilirubin and ALT and non-significant lower AST, alkaline phosphatase and prothrombin activity (P>0.05) than non-schistosomal patients.
- **HCV patients**: mildly significant lower serum albumin (P=0.04). mildly significant higher ALT and AST (P<0.05), non-significant higher bilirubin and alkaline phosphatase as well as non-significant lower prothrombin activity than non-HCV patients (P>0.05).

Table (33) showed comparison of non-schistosomal versus schistosomal patients and non-HCV versus HCV patients during the 1st two months after kidney transplantation

- **Schistosomal patients**: non-significant higher serum creatinine during the first 2 months after kidney transplantation than non-schistosomal patients.
- **HCV patients**: highly significant higher serum creatinine in 1st week (P=0.002). mildly significant higher serum creatinine in the 2nd week (P=0.02). highly significant lower serum creatinine in 3rd week (P=0.008). and non-significant higher serum creatinine during the 4th week and the 2nd month after kidney transplantation than non-HCV patients.

Table (34) showed comparison of non-schistosomal versus schistosomal patients and non-HCV versus HCV patients during the 3rd month after kidney transplantation

- **Schistosomal patients**: non-significant lower albumin, bilirubin, AST, and prothrombin activity as well as non-significant higher ALT and alkaline phosphatase than schistosomal patients (P>0.05). Moreover, serum creatinine was non-significantly higher than schistosomal patients (P>0.05) were.

- **HCV patients**: highly significantly lower serum albumin (P=0.004) and prothrombin activity (P=0.003) than non-HCV patients. non-significant lower bilirubin, mildly significant higher ALT and alkaline phosphatase (P=0.02) and non-significant higher AST than non-HCV group. Moreover. serum creatinine was non-significantly higher than non-HCV patients (P>0.05) were.

Table (35) showed comparison of non-schistosomal versus schistosomal patients and non-HCV versus HCV patients from the 4th to 12th months after kidney transplantation

- **Schistosomal patients**: non-significant higher serum creatinine from the 4th to 12th months after kidney transplantation than non-schistosomal patients.
- **HCV patients**: non-significant higher serum creatinine in the 4th. 5th. 9th. 10th and 11th months after kidney transplantation. However. mildly significant higher serum creatininee in the 6th. 7th. 8th. and 12th months after kidney transplantation than non-HCV patients (P<0.05).

Table (36) showed comparison of liver function in non-schistosomal versus schistosomal patients and non-HCV versus HCV patients in the 6th and16th months after kidney transplantation

- **Schistosomal patients**: non-significant lower serum albumin, ALT, AST, alkaline phosphatase and prothrombin activity and non-significant higher bilirubin than non-schistosomal patients in the 10th month (P>0.05). Also. in the 16th month. non-significant lower serum albumin. AST. alkaline phosphatase and prothrombin activity and non-significant higher ALT (P>0.05) and mildly significant higher bilirubin (P=0.02) than non-schistosomal patients in the 16th month.
- **HCV patients**: non-significant lower serum albumin and bilirubin, non-significant higher ALT. AST. and alkaline phosphatase (P>0.05) and mildly significant higher prothrombin activity (P=0.02) than non-HCV patients in the 10th month. In the 16th month. mildly significant lower serum albumin

(P=0.04), non-significant lower bilirubin, mildly significant higher ALT (P=0.01). non-significant higher AST and alkaline phosphatase (P>0.05) and highly significant lower prothrombin activity (P=0.002) than non-HCV group.

Table (37) showed comparison of serum creatinine in non-schistosomal versus schistosomal patients and non-HCV versus HCV patients from the 13th to 18th months after kidney transplantation

- **Schistosomal patients**: non-significant higher serum creatinine from the 13th to 18th months and number of rejection episodes after kidney transplantation than non-schistosomal patients (P>0.05).
- **HCV patients**: non-significant higher serum creatinine from the 13th to 18th months and number of rejection episodes after kidney transplantation than non-HCV patients (P>0.05).

Table (38) showed a correlation between pretransplant parameters and serum creatinine in all patients:

- **Age**: highly significant strong positive correlation during the whole period of study (P<0.001) except mild significant positive correlation in 9th. 11th. 12th.and 14th months (P<0.05) and non-significant positive correlation in 13th. 15th. 16th. 17th. and 18th months (P>0.05).
- **Albumin**: negative correlation during the whole period of study. strong in 1st week (P=0.007). non-significant in 2nd. 5th. 6th. and 12th weeks (P>0.05). mildly significant in 3rd. 4th. 7th. 8th. 9th. 10th. weeks 11th weeks as well as in the 5th month (P<0.05). Non-significant negative correlation from the 4th month to 18th month (P>0.05) except in the 5th month (P=0.02).
- **Bilirubin**: non-significant positive correlation with serum creatinine (P>0.05) except mildly significant in 8th and 9th weeks (P=0.04).
- **ALT**: very weak positive correlation except in the 2nd week it was very weak negative correlation (P>0.05).

- **AST**: very weak positive correlation except in the 4^{th}. 8^{th}. 9^{th}. 11^{th}. 13^{th}. 15^{th}. and 17^{th} months it was very weak negative correlation (P>0.05).
- **Alkaline phosphatase**: very weak negative correlation except in the 1^{st} week and 14^{th} month it was very weak positive correlation (P>0.05).
- **Prothrombin activity**: weak negative correlation (P>0.05) except in the 1^{st} and 8^{th} weeks it was mildly significant negative correlation (P<0.05).
- **HCV RNA (by PCR)**: positive correlation during the whole period of study. Highly significant in the 1^{st} and 3^{rd} weeks. mildly significant in 6^{th}. 7^{th}. 8^{th}. and 12^{th} months (P<0.05) and non-significant in the rest of the period of study (P>0.05).

Figures (1, 2, 3, 4, 5, and 6) showed illustration of number of rejection episodes in each group

Figures (7, 8, 9, 10, 11, and 12) showed illustrations of liver function tests between studied groups through the whole period of study

Figure (13) showed an illustration of serum creatinine in the studied groups

Nearly equal levels in all groups except HCV+schistosomiasis. which showed high basal post-transplant serum creatinine with a peak level (5 mg / dl) during 7^{th} and 8^{th} months.

Table (1): Descriptive data for all studied patients

Group	Age (years)	Weight (kg)	Sex		Liver		Liver biopsy		Spleen	
			M	F	normal	Enlarged	CAH	CPH	Normal	Enlarged
Control	27±11.45	64.3±17.56	19	6	25	0	0	0	25	0
No.	25		76	24	100	0	0	0	100	0
% within group	100									
HCV+IFN	30.1±9.8	64.1±15.48	12	4	9	7	3	13	13	3
No.	16		75	25	56.3	43.8	18.8	81.3	81.3	18.8
% within group	100									
HCV	35.1±10.3	71.5±7.8	8	4	11	1		4	12	0
No.	12		67	33	91.7	8.3		-	100	0
% within group	100									
HCV+HBV	29.8±9.2	70±6.0	3	2	3	2		4	4	1
No.	5		60	40	60	40		-	80	20
% within group	100									
HCV+Schist	33.4±10.7	69.75±11.7	6	2	5	3		2	6	2
No.	8		75	25	62.5	37.5		-	75	25
% within group	100									
Schist.	30.6±10.9	68.44±17.3	6	3	3	6			7	2
No.	9		67	33	33.3	66.7			77.8	22.2
% within group	100									

*IFN: interferon
*CAH: chronic active hepatitis
*CPH: chronic persistent hepatitis
*PCR: polymerase chain reaction

Table (1): Descriptive data for all studied patients (cont'd)

Group	PCR-HCV before Tx		PCR-HCV after Tx		Rejection number					
	-ve	+ve	-ve	+ve	0	1	2	3	4	6
Control										
No.	25	0	25	0	11	4	4	5	1	0
% within group	100	0	100	0	44	16	16	20	4	0
HCV +IFN										
No.	12	4	10	6	8	5	2	1	0	0
% within group	75	25	62.5	37.5	50	31.3	12.5	6.3		
HCV										
No.	5	7	4	8	8	2	1	1	0	0
% within group	41.7	58.3	33.3	66.7	66.7	16.7	8.3	8.3		
HCV+HBV										
No.	2	3	2	3	1	3	0	0	1	0
% within group	40	60	40	60	20	60			20	
HCV+Sch										
No.	2	6	2	6	2	0	2	3	0	1
% within group	25	75	25	75	25		25	37.5		12.5
Schist										
No.	9	0	9	0	4	3	2	0	0	0
% within group	100	0	100	0	44.4	33.3	22.2			

Figure (1): Incidence of rejection episodes in control group

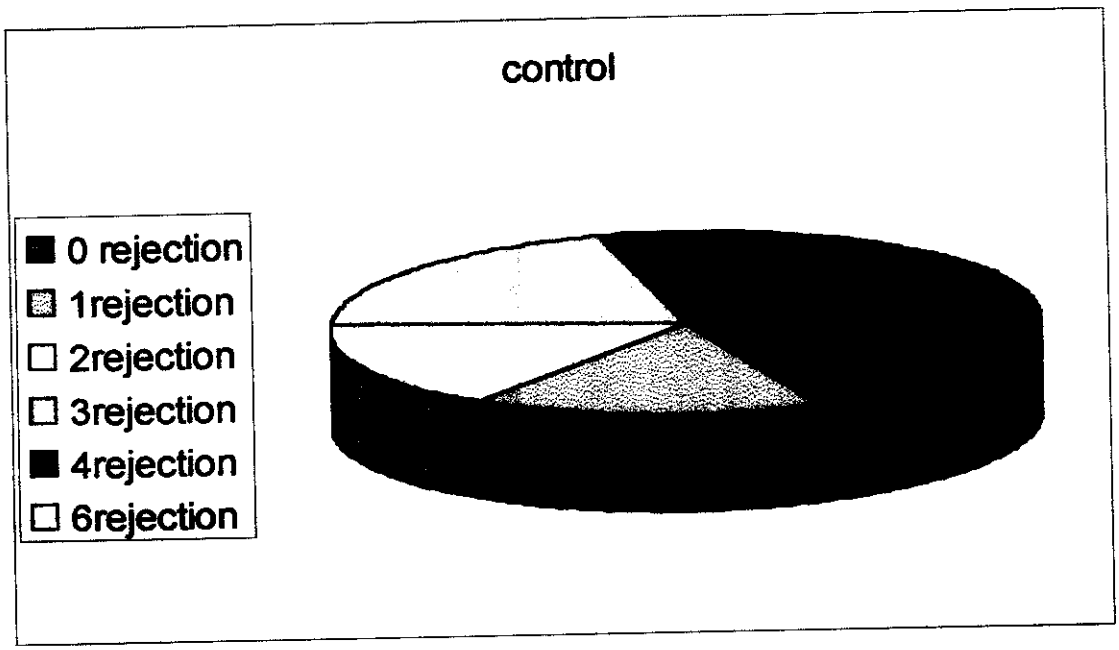


Figure (2): Incidence of rejection episodes in HCV+ IFN group

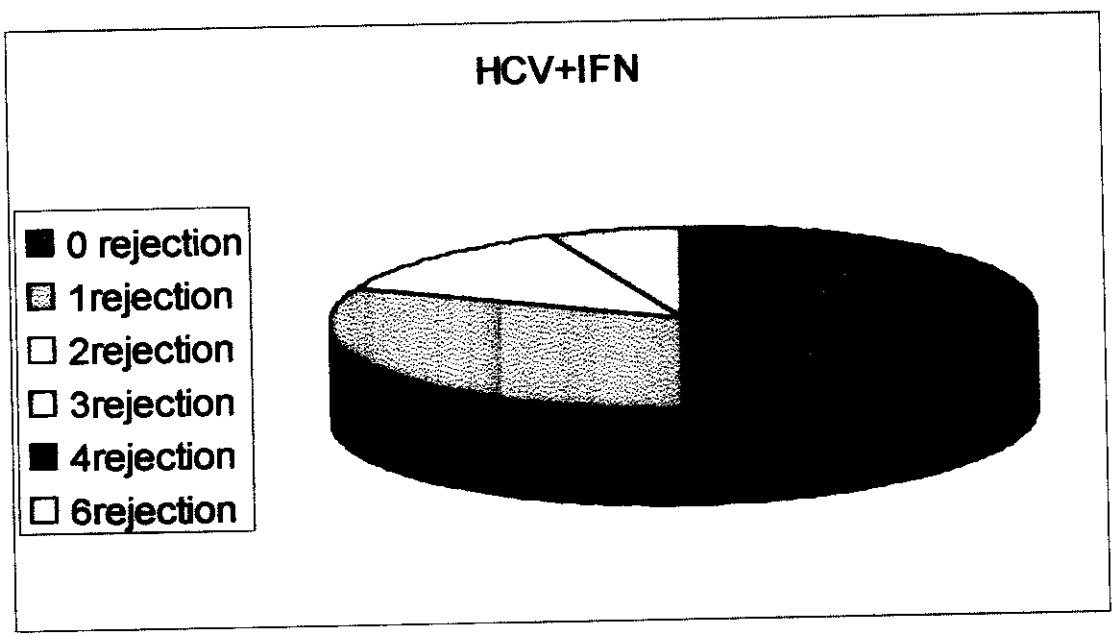


Figure (3): Incidence of rejection episodes in HCV group

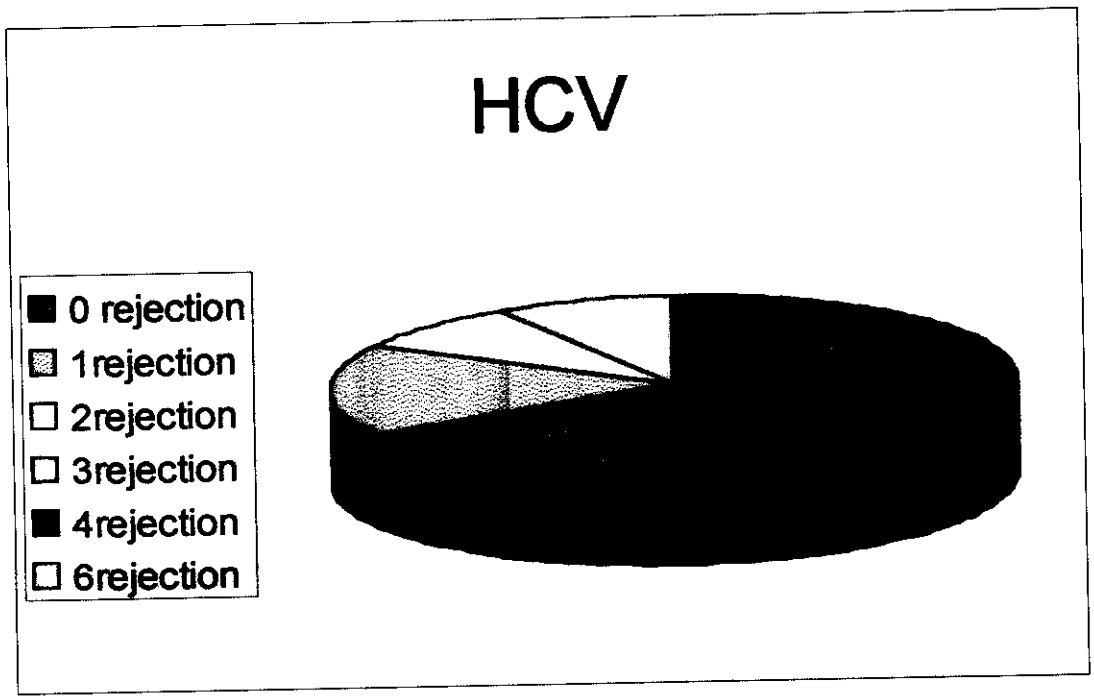


Figure (4): Incidence of rejection episodes in HCV + HBV group

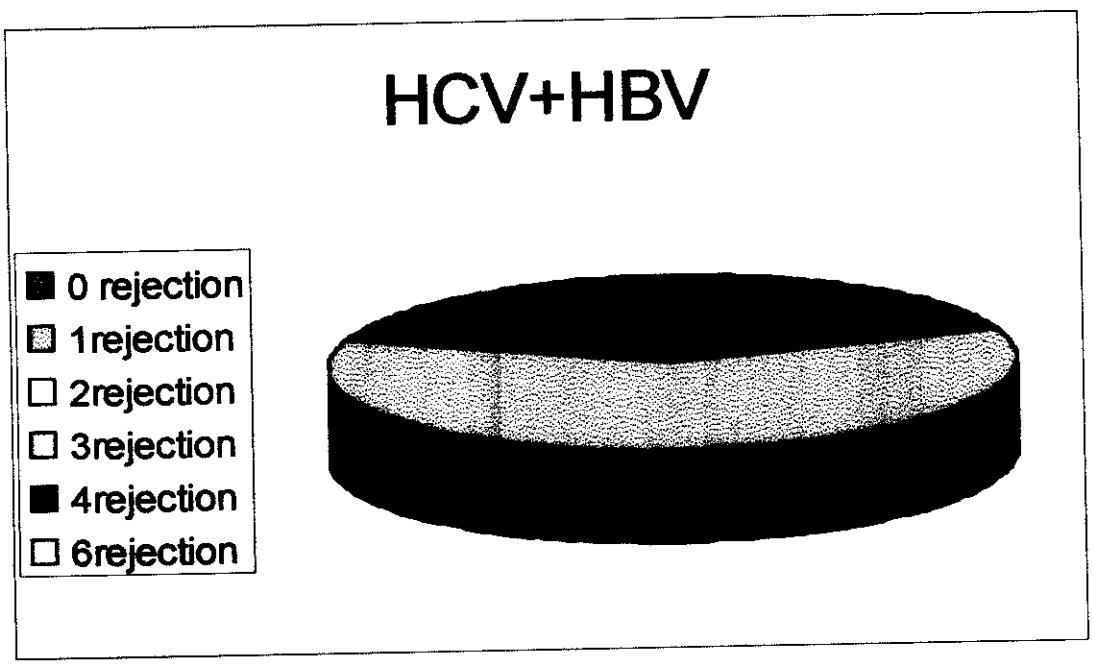


Figure (5): Incidence of rejection episodes in HCV + Schist. group

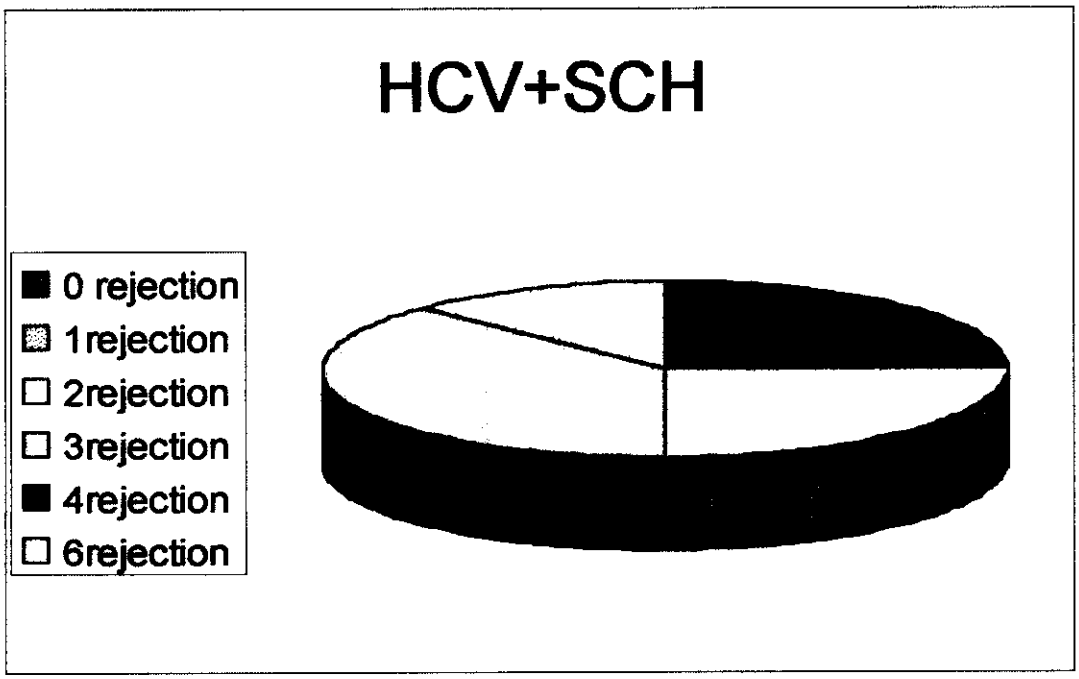


Figure (6): Incidence of rejection episodes in Schistosomiasis group

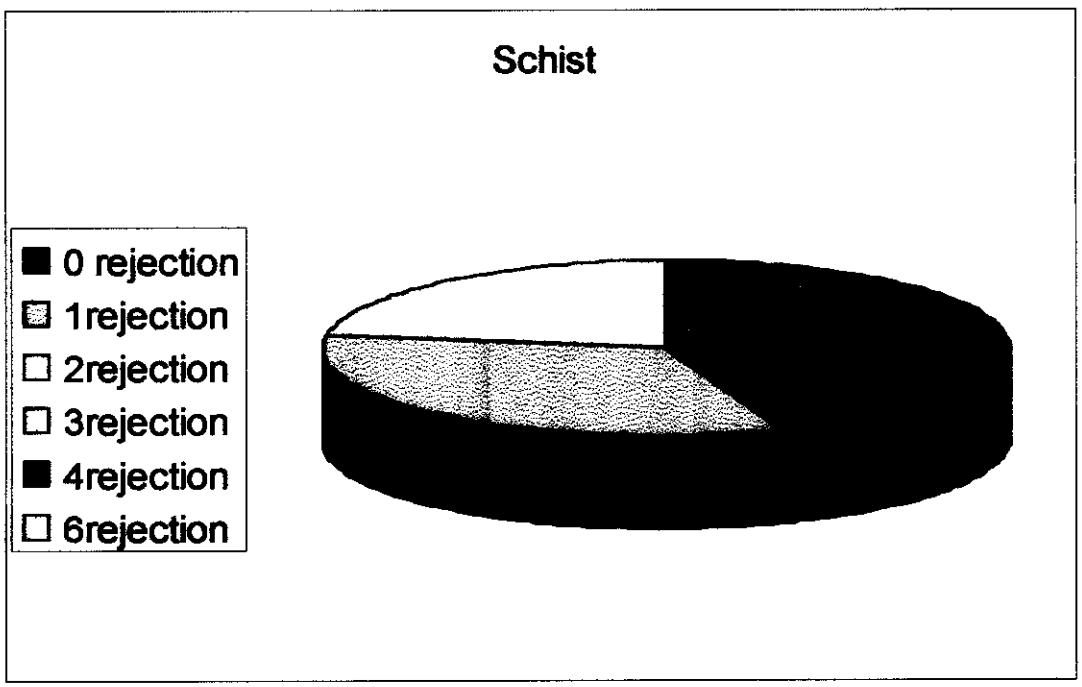


Table (2): Comparison of liver function between control and other studied groups before kidney transplantation

Group	Albumin	Bilirubin	ALT	AST	Alk. Phosph	Proth. activity
Control						
Mean ± SD	3.6±0.35	0.55±0.19	21.72±10.78	20.04±6.73	77±39.42	86.76±5.43
SE	0.07	0.04	2.16	1.35	7.88	1.09
HCV+IFN						
Mean ± SD	3.53±0.25	0.43±0.28	33.75±21.27	30.25±17.85	95.5±59.86	90.94±8.86
SE	0.06	0.07	5.32	4.46	14.96	2.21
P_1	**0.2**	**0.02**	**0.07**	**0.04**	**0.4**	**0.2**
HCV						
Mean ± SD	3.38±0.43	0.68±0.29	41.08±22.30	30.92±15.17	88.67±35.27	86.83±3.95
SE	0.12	0.08	6.44	4.38	10.18	1.14
P_2	**0.07**	**0.08**	**0.002**	**0.01**	**0.2**	**0.7**
HCV+HBV						
Mean ± SD	3.38±0.44	0.84±0.15	56.80±24.20	40.00±23.33	115.8±30.94	82.00±4.47
SE	0.20	0.07	10.82	10.44	13.84	2
P_3	**0.2**	**0.005**	**0.003**	**0.006**	**0.04**	**0.03**
HCV+Schist						
Mean ± SD	3.13±0.28	0.75±0.37	40.75±41.65	25.75±12.03	95.38±25.92	83.75±5.18
SE	0.10	0.13	14.72	4.25	9.16	1.83
P_4	**0.002**	**0.1**	**0.1**	**0.2**	**0.04**	**0.1**
Schistosomiasis						
Mean ± SD	3.47±0.30	0.59±0.25	30.11±18.25	17.78±5.40	73.78±39.13	90.44±4.56
SE	0.10	0.08	6.08	1.80	13.04	1.52
P_5	**0.1**	**0.5**	**0.2**	**0.3**	**0.6**	**0.03**

***P_1: comparison between control and HCV+IFN group**
***P_2: comparison between control and HCV group**
***P_3: comparison between control and HCV+HBV group**
***P_4: comparison between control and HCV+schistosomiasis group**
***P_5: comparison between control and schistosomiasis group**
***P < 0.05 is significant**

Table (3): Comparison of serum creatinine between control and other studied groups two-months after kidney transplantation

Group	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week	Creatinine 5th week	Creatinine 6th week	Creatinine 7th week	Creatinine 8th week
Control								
Mean ± SD	1.22±0.62	1.14±0.41	1.24±0.7	1.16±0.45	1.28±0.56	1.26±0.52	1.18±0.43	1.21±0.43
SE	0.12	0.08	0.14	0.09	0.11	0.10	0.09	0.09
HCV+IFN								
Mean ± SD	1.2±0.34	1.25±0.37	1.26±0.33	1.24±0.32	1.22±0.34	1.28±0.27	1.23±0.27	1.21±0.23
SE	0.09	0.09	0.08	0.08	0.08	0.07	0.07	0.06
P_1	**0.4**	**0.2**	**0.2**	**0.4**	**0.9**	**0.3**	**0.5**	**0.7**
HCV								
Mean ± SD	1.36±0.28	1.44±0.61	1.31±0.28	1.31±0.39	1.33±0.31	1.57±0.67	1.43±0.25	1.41±0.24
SE	0.08	0.18	0.08	0.11	0.09	0.19	0.07	0.07
P_2	**0.06**	**0.1**	**0.1**	**0.4**	**0.4**	**0.07**	**0.03**	**0.08**
HCV+HBV								
Mean ± SD	1.28±0.24	1.28±0.22	1.38±0.3	1.34±0.25	1.34±0.25	1.44±0.34	1.56±0.44	1.6±0.48
SE	0.11	0.1	0.14	0.11	0.11	0.15	0.20	0.22
P_3	**0.2**	**0.4**	**0.1**	**0.3**	**0.5**	**0.2**	**0.08**	**0.09**
HCV+Schist								
Mean ± SD	2.4±2.76	2.25±2.54	2.65±3.78	3.03±3.8	1.95±1.1	2.0±1.12	1.94±1.05	1.96±1.11
SE	4.71	0.9	1.34	1.34	0.39	0.4	0.37	0.39
P_4	**0.04**	**0.08**	**0.06**	**0.1**	**0.1**	**0.05**	**0.04**	**0.06**
Schistosomiasis								
Mean ± SD	1.08±0.19	1.09±0.2	1.1±0.16	1.14±0.16	1.17±0.22	1.21±0.2	1.24±0.21	1.16±0.2
SE	0.06	0.07	0.05	0.05	0.07	0.07	0.07	0.07
P_5	**0.8**	**0.7**	**0.9**	**0.9**	**0.8**	**0.7**	**0.5**	**0.8**

*P_1: comparison between control and HCV+IFN group
*P_2: comparison between control and HCV group
*P_3: comparison between control and HCV+HBV group
*P_4: comparison between control and HCV+schistosomiasis group
*P_5: comparison between control and schistosomiasis group
*$P < 0.05$ is significant

Table (4) A : Comparison between control and other studied groups In liver function tests three-months after kidney transplantation

Group	Albumin	Bilirubin	ALT	AST	Alk. phosph	Proth. activity
Control						
Mean ± SD	3.75±0.22	0.67±0.33	29.04±21.08	21.12±7.95	77.20±42.98	93.96±5.2
SE	0.04	0.07	4.22	1.59	8.6	1.04
HCV+IFN						
Mean ± SD	3.78±0.32	0.62±0.22	20.19±4.45	18.0±3.58	102.25±66.11	90.63±6.87
SE	0.08	0.05	1.11	0.89	16.53	1.72
P_1	**0.9**	**0.8**	**0.6**	**0.2**	**0.2**	**0.08**
HCV						
Mean ± SD	3.51±0.24	0.8±0.26	37.75±15.7	25.58±8.08	95.67±43.26	84.67±4.77
SE	0.07	0.07	4.53	2.33	12.49	1.38
P_2	**0.008**	**0.09**	**0.07**	**0.06**	**0.08**	**0.00**
HCV+HBV						
Mean ± SD	3.56±0.36	1.02±0.57	42.0±16.12	38±21.48	135.2±64.51	82.6±3.13
SE	0.16	0.26	7.21	9.61	28.85	1.4
P_3	**0.3**	**0.06**	**0.1**	**0.01**	**0.01**	**0.00**
HCV+Schist						
Mean ± SD	3.5±0.25	0.64±0.12	52±51.14	25.38±14.4	111.5±61.09	83.75±5.39
SE	0.09	0.04	18.08	5.11	21.6	1.91
P_4	**0.02**	**0.8**	**0.2**	**0.4**	**0.06**	**0.00**
Schist						
Mean ± SD	3.6±0.4	0.64±0.19	20.56±8.79	13.78±6.08	77±50.06	90.67±2.60
SE	0.13	0.06	2.93	2.03	16.69	0.87
P_5	**0.3**	**0.9**	**0.7**	**0.01**	**0.9**	**0.2**

***P_1: comparison between control and HCV+IFN group**
***P_2: comparison between control and HCV group**
***P_3: comparison between control and HCV+HBV group**
***P_4: comparison between control and HCV+schistosomiasis group**
***P_5: comparison between control and schistosomiasis group**

***P < 0.05 is significant**

Table (4) B: Comparison between control and other studied groups In S. creatinine three-months after kidney transplantation

Group	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week
Control				
Mean ± SD	1.24±0.48	1.26±0.6	1.23±0.44	1.23±0.44
SE	0.1	0.12	0.09	0.09
HCV+IFN				
Mean ± SD	1.15±0.24	1.19±0.24	1.19±0.21	1.18±0.21
SE	0.06	0.06	0.05	0.05
P_1	**0.8**	**0.7**	**0.8**	**0.8**
HCV				
Mean ± SD	1.41±0.28	1.41±0.35	1.49±0.48	1.43±0.42
SE	0.08	0.1	0.14	0.12
P_2	**0.1**	**0.1**	**0.1**	**0.1**
HCV+HBV				
Mean ± SD	1.58±0.54	1.48±0.58	1.5±0.63	1.52±0.72
SE	0.24	0.26	0.28	0.32
P_3	**0.1**	**0.3**	**0.3**	**0.5**
HCV+Schist				
Mean ± SD	1.95±1.11	2.03±1.14	2.03±1.13	1.83±0.95
SE	0.39	0.4	0.4	0.34
P_4	**0.1**	**0.06**	**0.09**	**0.1**
Schist				
Mean ± SD	1.16±0.17	1.21±0.2	1.19±0.28	1.21±0.26
SE	0.06	0.07	0.09	0.09
P_5	**0.9**	**0.5**	**0.9**	**0.9**

***P_1: comparison between control and HCV+IFN group**
***P_2: comparison between control and HCV group**
***P_3: comparison between control and HCV+HBV group**
***P_4: comparison between control and HCV+schistosomiasis group**
***P_5: comparison between control and schistosomiasis group**

***P < 0.05 is significant**

Table (5): Comparison of serum creatinine between control and other studied groups 4-to12 -months after kidney transplantation

Group	Creatinine 4th month	Creatinine 5th month	Creatinine 6th month	Creatinine 7th month	Creatinine 8th month	Creatinine 9th month	Creatinine 10th month	Creatinine 11th month	Creatinine 12th month
Control									
Mean ± SD	1.26±0.42	1.28±0.46	1.27±0.48	1.27±0.5	1.31±0.55	1.37±0.49	1.38±0.47	1.62±0.98	1.54±0.69
SE	0.08	0.09	0.1	0.10	0.11	0.10	0.10	0.20	0.14
HCV+IFN									
Mean ± SD	1.23±0.22	1.24±0.23	1.24±0.24	1.27±0.28	1.31±0.3	1.27±0.25	1.33±0.33	1.36±0.38	1.36±0.4
SE	0.06	0.06	0.06	0.07	0.07	0.06	0.08	0.10	0.10
P_1	**0.9**	**0.7**	**0.6**	**0.5**	**0.4**	**0.7**	**0.9**	**0.5**	**0.6**
HCV									
Mean ± SD	1.32±0.33	1.37±0.32	1.32±0.28	1.34±0.3	1.37±0.3	1.29±0.31	1.29±0.26	1.26±0.25	1.28±0.21
SE	0.09	0.09	0.08	0.09	0.09	0.09	0.07	0.07	0.06
P_2	**0.7**	**0.3**	**0.2**	**0.1**	**0.2**	**0.8**	**0.8**	**0.3**	**0.5**
HCV+HBV									
Mean ± SD	1.54±0.65	1.56±0.75	1.4±0.39	1.38±0.30	1.42±0.44	1.38±0.38	1.32±0.4	1.38±0.36	1.38±0.43
SE	0.29	0.34	0.18	14	0.20	0.17	0.18	0.16	0.19
P_3	**0.5**	**0.3**	**0.4**	**0.2**	**0.5**	**0.8**	**0.7**	**0.8**	**0.8**
HCV+schist									
Mean ± SD	2.22±1.22	2.24±1.24	2.19±1.05	4.94±7.36	2.26±1.10	2.03±0.78	1.99±0.91	2.1±0.89	1.96±0.73
SE	0.43	0.44	0.37	2.6	0.42	0.29	0.34	0.34	0.27
P_4	**0.04**	**0.02**	**0.005**	**0.002**	**0.009**	**0.02**	**0.1**	**0.07**	**0.1**
Schist.									
Mean ± SD	1.28±0.23	1.2±0.17	1.21±0.17	1.24±0.25	1.28±0.27	1.28±0.29	1.3±0.29	1.3±0.27	1.33±0.29
SE	0.08	0.06	0.06	0.08	0.09	0.10	0.10	0.09	0.10
P_5	**0.8**	**0.9**	**0.7**	**0.6**	**0.7**	**0.9**	**0.9**	**0.5**	**0.8**

*P_1: comparison between control and HCV+IFN group
*P_2: comparison between control and HCV group
*P_3: comparison between control and HCV+HBV group
*P_4: comparison between control and HCV+schistosomiasis group
*P_5: comparison between control and schistosomiasis group
*$P < 0.05$ is significant

Table (6): Comparison of liver functions between control and other studied groups

(A) 10 months after kidney transplantation

Group	Albumin 10th month	Bilirubin 10th month	ALT 10th month	AST 10th month	Alk. Phos 10th month	Proth. Activ. 10th month
Control						
Mean ± SD	3.86±0.38	0.71±0.22	23.33±20.46	19.63±9.63	85±42.11	92.29±5.7
SE	0.08	0.04	4.18	1.97	8.59	1.16
HCV+IFN						
Mean ± SD	3.96±0.37	0.79±0.2	16.81±8.8	15.63±3.77	104.6±63.8	92.19±5.94
SE	0.09	0.05	2.2	0.94	15.94	1.48
P_1	**0.4**	**0.2**	**0.2**	**0.1**	**0.5**	**0.7**
HCV						
Mean ± SD	3.78±0.31	0.89±0.44	29.58±23.71	24.4±14.55	85.25±28.7	86.33±4.58
SE	0.09	0.13	6.85	4.2	8.28	1.32
P_2	**0.4**	**0.2**	**0.1**	**0.1**	**0.6**	**0.007**
HCV+HBV						
Mean ± SD	3.9±0.20	0.78±0.25	24±7.31	29.2±23.23	94±36	87.2±4.15
SE	0.09	0.11	3.27	10.39	16.32	1.85
P_3	**0.8**	**0.6**	**0.1**	**0.3**	**0.5**	**0.02**
HCV+schist						
Mean ± SD	3.56±0.63	0.8±0.19	24.57±13.26	18.86±5.55	104.7±61.1	83.57±8
SE	0.24	0.07	5.01	2.1	23.11	3.02
P_4	**0.1**	**0.2**	**0.5**	**0.8**	**0.4**	**0.01**
Schist.						
Mean ± SD	3.83±0.29	0.8±0.24	18±6.86	14.89±2.2	57.78±13.9	91.11±0.93
SE	0.10	0.08	2.29	0.73	4.64	0.31
P_5	**0.4**	**0.1**	**0.8**	**0.07**	**0.06**	**1**

***P_1: comparison between control and HCV+IFN group**

***P_2: comparison between control and HCV group**

***P_3: comparison between control and HCV+HBV group**

***P_4: comparison between control and HCV+schistosomiasis group**

***P_5: comparison between control and schistosomiasis group**

***P < 0.05 is significant**

Table (6): Comparison of liver functions between control and other studied groups (B) 16 months after kidney transplantation

Group	Albumin 16th month	Bilirubin 16th month	ALT 16th month	AST 16th month	Alk. Phosph 16th month	Proth. Activ 16th month
Control						
Mean ± SD	3.96±0.2	0.73±0.2	23.67±17.71	20.58±9.28	71.38±28.28	92.21±4.92
SE	0.04	0.04	3.61	1.89	5.77	1
HCV+IFN						
Mean ± SD	4.03±0.34	0.69±0.18	17.81±7.55	16.31±5.4	90.13±60.58	90.38±5.94
SE	0.09	0.04	1.89	1.35	15.15	1.49
P_1	**0.2**	**0.3**	**0.09**	**0.06**	**0.6**	**0.7**
HCV						
Mean ± SD	3.87±0.23	0.87±0.26	26.92±20.46	24±20.35	68.67±21.41	88.08±3.87
SE	0.07	0.08	5.91	5.87	6.18	1.12
P_2	**0.1**	**0.1**	**0.5**	**0.8**	**0.7**	**0.05**
HCV+HBV						
Mean ± SD	3.86±0.24	0.84±0.17	33.8±32	31.4±15.95	74.8±29.25	85.6±5.37
SE	0.11	0.07	14.31	7.13	13.08	2.4
P_3	**0.6**	**0.2**	**0.8**	**0.08**	**0.9**	**0.01**
HCV+schist						
Mean ± SD	3.87±0.54	0.86±0.19	34.71±31.46	23.86±13.0	90.57±44.77	84.57±5.13
SE	0.2	0.07	11.89	4.93	16.92	1.94
P_4	**0.8**	**0.1**	**0.4**	**0.3**	**0.4**	**0.007**
Schist.						
Mean ± SD	3.84±0.18	0.93±0.27	18.67±7.63	15.44±4.39	52.89±29.43	91.11±3.98
SE	0.06	0.09	2.54	1.46	9.81	1.33
P_5	**0.1**	**0.03**	**0.3**	**0.1**	**0.04**	**0.8**

***P_1: comparison between control and HCV+IFN group**
***P_2: comparison between control and HCV group**
***P_3: comparison between control and HCV+HBV group**
***P_4: comparison between control and HCV+schistosomiasis group**
***P_5: comparison between control and schistosomiasis group**

***P < 0.05 is significant**

Table (7): Comparison in serum creatinine between control and other groups 13- to 18 - months after kidney transplantation

Group	Creatinine 13th month	Creatinine 14th month	Creatinine 15th month	Creatinine 16th month	Creatinine 17th month	Creatinine 18th month	Rejection no.
Control							
Mean ± SD	1.55±0.72	1.53±0.72	1.57±0.88	1.57±0.72	1.64±0.79	1.68±0.89	1.24±1.33
SE	0.15	0.15	0.18	0.15	0.16	0.18	0.27
HCV+IFN							
Mean ± SD	1.29±0.32	1.41±0.36	1.32±0.38	1.34±0.32	1.33±0.28	1.41±0.35	0.75±0.93
SE	0.08	0.09	0.10	0.08	0.07	0.09	0.23
P_1	**0.1**	**0.8**	**0.7**	**0.5**	**0.4**	**0.7**	**0.3**
HCV							
Mean ± SD	1.27±0.28	1.32±0.2	1.3±0.26	1.3±0.24	1.33±0.28	1.32±0.26	0.58±1.0
SE	0.08	0.06	0.08	0.07	0.08	0.07	0.29
P_2	**0.2**	**0.9**	**0.9**	**0.5**	**0.3**	**0.5**	**0.1**
HCV+HBV							
Mean ± SD	1.52±0.47	1.56±0.47	1.92±1.29	1.42±0.45	1.38±0.47	1.42±0.5	1.4±1.52
SE	0.21	0.21	0.58	0.2	0.21	0.22	0.68
P_3	**0.9**	**0.5**	**0.6**	**0.8**	**0.5**	**0.8**	**0.7**
HCV+schist							
Mean ± SD	2.03±0.77	1.96±0.74	1.91±0.75	2.01±0.93	1.89±0.7	1.84±0.65	2.38±1.92
SE	0.29	0.28	0.28	0.35	0.26	0.24	0.68
P_4	**0.1**	**0.1**	**0.1**	**0.2**	**0.2**	**0.3**	**0.1**
Schist.							
Mean ± SD	1.32±0.37	1.39±0.38	1.36±0.36	1.34±0.27	1.31±0.26	1.31±0.31	0.78±0.83
SE	0.12	0.13	0.12	0.09	0.09	0.1	0.28
P_5	**0.6**	**0.9**	**0.9**	**0.9**	**0.5**	**0.5**	**0.5**

***P_1: comparison between control and HCV+IFN group**
***P_2: comparison between control and HCV group**
***P_3: comparison between control and HCV+HBV group**
***P_4: comparison between control and HCV+schistosomiasis group**
***P_5: comparison between control and schistosomiasis group**
***$P < 0.05$ is significant**

Table (8): Comparison between HCV + IFN group and other groups before kidney transplantation

Group	Albumin	Bilirubin	ALT	AST	Alk. Phosph	Proth. activity
HCV+IFN						
Mean ± SD	3.53±0.25	0.43±0.28	33.75±21.27	30.25±17.85	95.5±59.86	90.94±8.86
SE	0.06	0.07	5.32	4.46	14.96	2.21
HCV						
Mean ± SD	3.38±0.43	0.68±0.29	41.08±22.30	30.92±15.17	88.67±35.27	86.83±3.95
SE	0.12	0.08	6.44	4.38	10.18	1.14
P_1	**0.2**	**0.02**	**0.2**	**0.7**	**0.7**	**0.3**
HCV+HBV						
Mean ± SD	3.38±0.44	0.84±0.15	56.80±24.20	40.00±23.33	115.8±30.94	82.00±4.47
SE	0.20	0.07	10.82	10.44	13.84	2
P_2	**0.6**	**0.003**	**0.05**	**0.2**	**0.1**	**0.04**
HCV+Schist						
Mean ± SD	3.13±0.28	0.75±0.37	40.75±41.65	25.75±12.03	95.38±25.92	83.75±5.18
SE	0.10	0.13	14.72	4.25	9.16	1.83
P_3	**0.005**	**0.02**	**1**	**0.6**	**0.3**	**0.05**
Schistosom.						
Mean ± SD	3.47±0.30	0.59±0.25	30.11±18.25	17.78±5.40	73.78±39.13	90.44±4.56
SE	0.10	0.08	6.08	1.80	13.04	1.52
P_4	**0.4**	**0.08**	**0.7**	**0.03**	**0.2**	**0.9**

***P_1: comparison between HCV+IFN group and HCV group**
***P_2: comparison between HCV+IFN group and HCV+ HBV group**
***P_3: comparison between HCV+IFN group and HCV+schistosomiasis group**
***P_4: comparison between HCV+IFN group and schistosomiasis group**
****P < 0.05 is significant***

Table (9): Comparison in serum creatinine between HCV+IFN group and other groups two-months after kidney transplantation

Group	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week	Creatinine 5th week	Creatinine 6th week	Creatinine 7th week	Creatinine 8th week
CV+IFN								
Mean ± SD	1.2±0.34	1.25±0.37	1.26±0.33	1.24±0.32	1.22±0.34	1.28±0.27	1.23±0.27	1.21±0.23
SE	0.09	0.09	0.08	0.08	0.08	0.07	0.07	0.06
HCV								
Mean ± SD	1.36±0.28	1.44±0.61	1.31±0.28	1.31±0.39	1.33±0.31	1.57±0.67	1.43±0.25	1.41±0.24
SE	0.08	0.18	0.08	0.11	0.09	0.19	0.07	0.07
P_1	**0.3**	**0.9**	**0.9**	**0.9**	**0.6**	**0.3**	**0.08**	**0.03**
HCV+HBV								
Mean ± SD	1.28±0.24	1.28±0.22	1.38±0.3	1.34±0.25	1.34±0.25	1.44±0.34	1.56±0.44	1.6±0.48
SE	0.11	0.1	0.14	0.11	0.11	0.15	0.20	0.22
P_2	**0.7**	**0.9**	**0.4**	**0.6**	**0.6**	**0.5**	**0.1**	**0.07**
HCV+Schis								
Mean ± SD	2.4±2.76	2.25±2.54	2.65±3.78	3.03±3.8	1.95±1.1	2.0±1.12	1.94±1.05	1.96±1.11
SE	4.71	0.9	1.34	1.34	0.39	0.4	0.37	0.39
P_3	**0.06**	**0.3**	**0.4**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**
Schist.								
Mean ± SD	1.08±0.19	1.09±0.2	1.1±0.16	1.14±0.16	1.17±0.22	1.21±0.2	1.24±0.21	1.16±0.2
SE	0.06	0.07	0.05	0.05	0.07	0.07	0.07	0.07
P_4	**0.3**	**0.1**	**0.1**	**0.3**	**0.6**	**0.4**	**0.8**	**0.3**

*P_1: comparison between HCV+IFN group and HCV group
*P_2: comparison between HCV+IFN group and HCV+ HBV group
*P_3: comparison between HCV+IFN group and HCV+schistosomiasis group
*P_4: comparison between HCV+IFN group and schistosomiasis group
**$P < 0.05$ is significant

Table (10): Comparison between HCV + IFN group and other groups three-months after kidney transplantation

Group	albumin	Bilirubin	ALT	AST	Alk. Phosph	Proth. activity
HCV+IFN						
Mean ± SD	3.78±0.32	0.62±0.22	20.19±4.45	18.0±3.58	102.25±66.1	90.63±6.87
SE	0.08	0.05	1.11	0.89	16.53	1.72
HCV						
Mean ± SD	3.51±0.24	0.8±0.26	37.75±15.7	25.58±8.08	95.67±43.26	84.67±4.77
SE	0.07	0.07	4.53	2.33	12.49	1.38
P1	**0.01**	**0.05**	**0.001**	**0.001**	**0.8**	**0.02**
HCV+HBV						
Mean ± SD	3.56±0.36	1.02±0.57	42.0±16.12	38±21.48	135.2±64.51	82.6±3.13
SE	0.16	0.26	7.21	9.61	28.85	1.4
P_2	**0.3**	**0.07**	**0.006**	**0.002**	**0.3**	**0.02**
HCV+schist						
Mean ± SD	3.5±0.25	0.64±0.12	52±51.14	25.38±14.4	111.5±61.09	83.75±5.39
SE	0.09	0.04	18.08	5.11	21.6	1.91
P_3	**0.3**	**0.7**	**0.8**	**0.1**	**0.2**	**0.6**
Schist.						
Mean ± SD	3.6±0.4	0.64±0.19	20.56±8.79	13.78±6.08	77±50.06	90.67±2.60
SE	0.13	0.06	2.93	2.03	16.69	0.87
P_4	**0.01**	**0.6**	**0.05**	**0.1**	**0.5**	**0.03**

***P_1: comparison between HCV+IFN group and HCV group**
***P_2: comparison between HCV+IFN group and HCV+ HBV group**
***P_3: comparison between HCV+IFN group and HCV+schistosomiasis group**
***P_4: comparison between HCV+IFN group and schistosomiasis group**

****$P < 0.05$ is significant**

Table (10): Comparison between HCV + IFN group and other groups three-months after kidney transplantation (cont'd)

Group	Creatinine 1st week	creatinine 2nd week	creatinine 3rd week	creatinine 4th week
HCV+IFN				
Mean ± SD	1.15±0.24	1.19±0.24	1.19±0.21	1.18±0.21
SE	0.06	0.06	0.05	0.05
HCV				
Mean ± SD	1.41±0.28	1.41±0.35	1.49±0.48	1.43±0.42
SE	0.08	0.1	0.14	0.12
P1	**0.004**	**0.1**	**0.05**	**0.04**
HCV+HBV				
Mean ± SD	1.58±0.54	1.48±0.58	1.5±0.63	1.52±0.72
SE	0.24	0.26	0.28	0.32
P_2	**0.04**	**0.3**	**0.3**	**0.3**
HCV+schist				
Mean ± SD	1.95±1.11	2.03±1.14	2.03±1.13	1.83±0.95
SE	0.39	0.4	0.4	0.34
P_3	**0.9**	**0.8**	**0.9**	**0.8**
Schist.				
Mean ± SD	1.16±0.17	1.21±0.2	1.19±0.28	1.21±0.26
SE	0.06	0.07	0.09	0.09
P_4	**0.1**	**0.1**	**0.1**	**0.1**

*P_1: comparison between HCV+IFN group and HCV group
*P_2: comparison between HCV+IFN group and HCV+ HBV group
*P_3: comparison between HCV+IFN group and HCV+schistosomiasis group
*P_4: comparison between HCV+IFN group and schistosomiasis group
**$P < 0.05$ is significant*

Table (11): Comparison in serum creatinine between HCV + IFN group and other groups 4- to 12-months after kidney transplantation

Group	Creatinine 4th month	Creatinine 5th month	Creatinine 6th month	Creatinine 7th month	Creatinine 8th month	Creatinine 9th month	Creatinine 10th month	Creatinine 11th month	Creatinine 12th month
V+IFN Mean ± SD	1.23±0.22	1.24±0.23	1.24±0.24	1.27±0.28	1.31±0.3	1.27±0.25	1.33±0.33	1.36±0.38	1.36±0.4
CV Mean ± SD	1.32±0.33	1.37±0.32	1.32±0.28	1.34±0.3	1.37±0.3	1.29±0.31	1.29±0.26	1.26±0.25	1.28±0.21
P_1	0.5	0.3	0.5	0.5	0.6	0.9	0.9	0.6	1
HCV+HBV Mean ± SD	1.54±0.65	1.56±0.75	1.4±0.39	1.38±0.30	1.42±0.44	1.38±0.38	1.32±0.4	1.38±0.36	1.38±0.43
P_2	0.3	0.6	0.4	0.3	0.7	0.6	0.7	1	0.9
HCV+schist Mean ± SD	2.22±1.22	2.24±1.24	2.19±1.05	4.94±7.36	2.26±1.10	2.03±0.78	1.99±0.91	2.1±0.89	1.96±0.73
P_3	0.04	0.03	0.006	0.005	0.02	0.01	0.1	0.01	0.03
Schist. Mean ± SD	1.28±0.23	1.2±0.17	1.21±0.17	1.24±0.25	1.28±0.27	1.28±0.29	1.3±0.29	1.3±0.27	1.33±0.29
P_4	0.5	0.6	0.8	0.8	0.8	0.9	0.9	1	0.8

*P_1: comparison between HCV+IFN group and HCV group
*P_2: comparison between HCV+IFN group and HCV+ HBV group
*P_3: comparison between HCV+IFN group and HCV+ schistosomiasis group
*P_4: comparison between HCV+IFN group and schist. Group
**$P < 0.05$ is significant

Table (12): Comparison of liver functions between HCV + IFN group and other groups (A) 10 - months after kidney Tx

Group	Albumin	Bilirubin	ALT	AST	Alk. Phosph	Proth. Activity
HCV+IFN						
Mean ± SD	3.96±0.37	0.79±0.2	16.81±8.8	15.63±3.77	104.6±63.8	92.19±5.94
HCV						
Mean ± SD	3.78±0.31	0.89±0.44	29.58±23.7	24.4±14.55	85.3±28.69	86.33±4.58
P1	**0.1**	**0.7**	**0.02**	**0.007**	**0.8**	**0.02**
HCV+HBV						
Mean ± SD	3.9±0.20	0.78±0.25	24±7.31	29.2±23.23	94±36	87.2±4.15
P2	**0.6**	**0.7**	**0.06**	**0.09**	**0.7**	**0.1**
HCV+schist						
Mean± SD	3.56±0.63	0.8±0.19	24.57±13.3	18.86±5.55	104.7±61.1	83.57±8
P3	**0.1**	**0.9**	**0.1**	**0.2**	**0.7**	**0.03**
Schist.						
Mean ± SD	3.83±0.29	0.8±0.24	18±6.86	14.89±2.2	57.78±13.9	91.11±0.93
P4	**0.2**	**0.3**	**0.3**	**0.7**	**0.02**	**0.7**

*P_1: comparison between HCV+IFN group and HCV group
*P_2: comparison between HCV+IFN group and HCV+ HBV group
*P_3: comparison between HCV+IFN group and HCV+schistosomiasis group
*P_4: comparison between HCV+IFN group and schistosomiasis group

**$P < 0.05$ is significant.

Table (12): Comparison of liver functions between HCV + IFN group and other groups (B) 16 - months after kidney Tx

Group	albumin	Bilirubin	ALT	AST	Alk. Phosph	Proth. Activ
HCV+IFN Mean ± SD	4.03±0.34	0.69±0.18	17.81±7.55	16.31±5.4	90.13±60.58	90.38±5.94
HCV Mean ± SD	3.87±0.23	0.87±0.26	26.92±20.46	24±20.35	68.67±21.41	88.08±3.87
P1	**0.1**	**0.06**	**0.07**	**0.05**	**0.6**	**0.1**
HCV+HBV Mean ± SD	3.86±0.24	0.84±0.17	33.8±32	31.4±15.95	74.8±29.25	85.6±5.37
P2	**0.2**	**0.07**	**0.3**	**0.01**	**0.9**	**0.1**
HCV+schist Mean± SD	3.87±0.54	0.86±0.19	34.71±31.46	23.86±13.0	90.57±44.77	84.57±5.13
P3	**0.6**	**0.08**	**0.1**	**0.07**	**0.6**	**0.02**
Schist. Mean ± SD	3.84±0.18	0.93±0.27	18.67±7.63	15.44±4.39	52.89±29.43	91.11±3.98
P4	**0.06**	**0.01**	**0.9**	**0.6**	**0.03**	**0.6**

*P_1: comparison between HCV+IFN group and HCV group
*P_2: comparison between HCV+IFN group and HCV+ HBV group
*P_3: comparison between HCV+IFN group and HCV+schistosomiasis group
*P_4: comparison between HCV+IFN group and schistosomiasis group

**$P < 0.05$ is significant.

Table (13): Comparison in serum creatinine between HCV + IFN group and other groups 13- to 18 - months after kidney transplantation

Group	Creatinine 13th month	Creatinine 14th month	Creatinine 15th month	Creatinine 16th month	Creatinine 17th month	Creatinine 18th month	Rejection no.
HCV+IFN Mean ± SD	1.29±0.32	1.41±0.36	1.32±0.38	1.34±0.32	1.33±0.28	1.41±0.35	0.75±0.93
HCV Mean ± SD	1.27±0.28	1.32±0.2	1.3±0.26	1.3±0.24	1.33±0.28	1.32±0.26	0.58±1.0
P_1	0.8	0.5	0.7	0.8	0.8	0.7	0.5
HCV+HBV Mean ± SD	1.52±0.47	1.56±0.47	1.92±1.29	1.42±0.45	1.38±0.47	1.42±0.5	1.4±1.52
P_2	0.2	0.5	0.4	0.9	0.6	0.6	0.3
HCV+schist Mean ± SD	2.03±0.77	1.96±0.74	1.91±0.75	2.01±0.93	1.89±0.7	1.84±0.65	2.38±1.92
P_3	0.01	0.1	0.06	0.1	0.07	0.1	0.03
Schist. Mean ± SD	1.32±0.37	1.39±0.38	1.36±0.36	1.34±0.27	1.31±0.26	1.31±0.31	0.78±0.83
P_4	0.8	0.9	0.7	0.6	0.8	0.6	0.8

*P_1: comparison between HCV+IFN group and HCV group
*P_2: comparison between HCV+IFN group and HCV+ HBV group
*P_3: comparison between HCV+IFN group and HCV+schistosomiasis group
*P_4: comparison between HCV+IFN group and schistosomiasis group
**$P < 0.05$ is significant.*

Table (14): Comparison between HCV group and other studied groups before kidney transplantation

Group	Albumin	Bilirubin	ALT	AST	Alk. Phosph	Proth. activ
HCV						
Mean ± SD	3.38±0.43	0.68±0.29	41.08±22.30	30.92±15.17	88.67±35.27	86.83±3.95
HCV+HBV						
Mean ± SD	3.38±0.44	0.84±0.15	56.80±24.20	40.00±23.33	115.8±30.94	82.00±4.47
P1	**0.9**	**0.2**	**0.1**	**0.3**	**0.1**	**0.08**
HCV+schist						
Mean ± SD	3.13±0.28	0.75±0.37	40.75±41.65	25.75±12.03	95.38±25.92	83.75±5.18
P2	**0.1**	**0.7**	0.5	**0.4**	**0.6**	**0.2**
Schist.						
Mean ± SD	3.47±0.30	0.59±0.25	30.11±18.25	17.78±5.40	73.78±39.13	90.44±4.56
P3	**0.5**	**0.3**	**0.1**	**0.004**	**0.2**	**0.03**

*P_1: comparison between HCV group and HCV+HBV group *P_2: comparison between HCV group and HCV+ schistosomiasis group
*P_3: comparison between HCV group and schistosomiasis group **$P < 0.05$ is significant*

Table (15): Comparison in serum creatinine between HCV group and other groups two-months after kidney transplantation

Group	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week	Creatinine 5th week	Creatinine 6th week	Creatinine 7th week	Creatinine 8th week
HCV								
Mean ± SD	1.36±0.28	1.44±0.61	1.31±0.28	1.31±0.39	1.33±0.31	1.57±0.67	1.43±0.25	1.41±0.24
HCV+HBV								
Mean ± SD	1.28±0.24	1.28±0.22	1.38±0.3	1.34±0.25	1.34±0.25	1.44±0.34	1.56±0.44	1.6±0.48
P1	**0.7**	**0.9**	**0.3**	**0.7**	**0.3**	**0.5**	**0.7**	**0.6**
HCV+schist								
Mean ± SD	2.4±2.76	2.25±2.54	2.65±3.78	3.03±3.8	1.95±1.1	2.0±1.12	1.94±1.05	1.96±1.11
P2	**0.2**	**0.3**	**0.3**	**0.2**	**0.1**	**0.05**	**0.04**	**0.06**
Schist.								
Mean ± SD	1.08±0.19	1.09±0.2	1.1±0.16	1.14±0.16	1.17±0.22	1.21±0.2	1.24±0.21	1.16±0.2
P3	**0.02**	**0.1**	**0.05**	**0.3**	**0.3**	**0.1**	**0.1**	**0.01**

*P_1: comparison between HCV group and HCV+HBV group *P_2: comparison between HCV+IFN group and HCV+ schist group
*P_3: comparison between HCV group and schistosomiasis group **$P < 0.05$ is significant*

Table (16): Comparison between HCV group and other studied groups three-months after kidney transplantation

(A) In liver function

Group	albumin	Bilirubin	ALT	AST	Alk. Phosph	Proth. activ
HCV						
Mean ± SD	3.51±0.24	0.8±0.26	37.75±15.7	25.58±8.08	95.67±43.26	84.67±4.77
HCV+HBV						
Mean ± SD	3.56±0.36	1.02±0.57	42.0±16.12	38±21.48	135.2±64.51	82.6±3.13
P1	1	0.6	0.5	0.1	0.1	0.5
HCV+schist						
Mean ± SD	3.5±0.25	0.64±0.12	52±51.14	25.38±14.4	111.5±61.09	83.75±5.39
P2	0.9	0.1	0.9	0.6	0.5	0.7
Schist.						
Mean ± SD	3.6±0.4	0.64±0.19	20.56±8.79	13.78±6.08	77±50.06	90.67±2.60
P3	0.3	0.1	0.009	0.00	0.3	0.002

(B) In Serum Creatinine

Group	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week
HCV				
Mean ± SD	1.41±0.28	1.41±0.35	1.49±0.48	1.43±0.42
HCV+HBV				
Mean ± SD	1.58±0.54	1.48±0.58	1.5±0.63	1.52±0.72
P1	1	0.7	0.7	0.7
HCV+schist				
Mean ± SD	1.95±1.11	2.03±1.14	2.03±1.13	1.83±0.95
P2	0.7	0.5	0.7	0.7
Schist.				
Mean ± SD	1.16±0.17	1.21±0.2	1.19±0.28	1.21±0.26
P3	0.007	0.3	0.1	0.1

*P_1: comparison between HCV group and HCV+HBV group

*P_2: comparison between HCV group and HCV+ schist group

*P_3: comparison between HCV group and schist

P < 0.05 is significant

Table (17): Comparison of serum creatinine between HCV group and other groups 4- to 12-months after kidney transplantation

Group	Creat 4th month	Creat 5th month	Creat 6th month	Creat.7th month	Creat 8th month	Creat 9th month	Creat 10th month	Creat 11th month	Creat 12th month
HCV Mean ± SD	1.32±0.33	1.37±0.32	1.32±0.28	1.34±0.3	1.37±0.3	1.29±0.31	1.29±0.26	1.26±0.25	1.28±0.21
HCV+HBV Mean ± SD	1.54±0.65	1.56±0.75	1.4±0.39	1.38±0.30	1.42±0.44	1.38±0.38	1.32±0.4	1.38±0.36	1.38±0.43
P_1	**0.5**	**0.9**	**0.7**	**0.9**	**0.8**	**0.5**	**0.7**	**0.6**	**0.8**
HCV+schist Mean ± SD	2.22±1.22	2.24±1.24	2.19±1.05	4.94±7.36	2.26±1.10	2.03±0.78	1.99±0.91	2.1±0.89	1.96±0.73
P2	**0.1**	**0.1**	**0.02**	**0.01**	**0.03**	**0.02**	**0.1**	**0.007**	**0.06**
Schist. Mean ± SD	1.28±0.23	1.2±0.17	1.21±0.17	1.24±0.25	1.28±0.27	1.28±0.29	1.3±0.29	1.3±0.27	1.33±0.29
P3	**0.9**	**0.2**	**0.3**	**0.4**	**0.5**	**0.9**	**0.9**	**0.06**	**0.7**

*P_1: comparison between HCV group and HCV+HBV group
*P_2: comparison between HCV group and HCV+ schistosomiasis group
*P_3: comparison between HCV group and schistosomiasis group
**$P < 0.05$ is significant

Table (18): Comparison of liver function between HCV group and other groups

(A) 10 - months after kidney transplantation

Group	Albumin 10th month	Bilirubin 10th month	ALT 10th month	AST 10th month	Alk. Phosph 10th month	Proth. Activ 10th month
HCV Mean ± SD	3.78±0.31	0.89±0.44	29.58±23.71	24.4±14.55	85.25±28.69	86.33±4.58
HCV+HBV Mean ± SD	3.9±0.20	0.78±0.25	24±7.31	29.2±23.23	94±36	87.2±4.15
P1	0.4	0.6	0.8	0.9	0.7	0.9
HCV+schist Mean ± SD	3.56±0.63	0.8±0.19	24.57±13.26	18.86±5.55	104.7±61.14	83.57±8
P2	0.3	0.7	0.7	0.2	0.6	0.5
Schist. Mean ± SD	3.83±0.29	0.8±0.24	18±6.86	14.89±2.2	57.78±13.92	91.11±0.93
P3	0.9	0.8	0.09	0.002	0.004	0.009

(B) 16 - months after kidney transplantation

Group	Albumin 16th month	Bilirubin 16th month	ALT 16th month	AST 16th month	Alk. Phosph 16th month	Proth. Activ 16th month
HCV Mean ± SD	3.87±0.23	0.87±0.26	26.92±20.46	24±20.35	68.67±21.41	88.08±3.87
HCV+HBV Mean ± SD	3.86±0.24	0.84±0.17	33.8±32	31.4±15.95	74.8±29.25	85.6±5.37
P1	0.9	0.9	0.9	0.1	0.7	0.2
HCV+schist Mean ± SD	3.87±0.54	0.86±0.19	34.71±31.46	23.86±13.0	90.57±44.77	84.57±5.13
P2	0.5	0.9	0.7	0.2	0.2	0.1
Schist. Mean ± SD	3.84±0.18	0.93±0.27	18.67±7.63	15.44±4.39	52.89±29.43	91.11±3.98
P3	0.9	0.7	0.2	0.2	0.01	0.04

*P_1: comparison between HCV group and HCV+HBV group
*P_2: comparison between HCV group and HCV+ schist group
*P_3: comparison between HCV group and Schist. group
**$P < 0.05$ is significant.

Table (19): Comparison of serum creatinine between HCV group and other groups 13-to 18 – months after kidney transplantation

Group	Creatinine 13th month	Creatinine 14th month	Creatinine 15th month	Creatinine 16th month	Creatinine 17th month	Creatinine 18th month	Rejection no.
HCV							
Mean ± SD	1.27±0.28	1.32±0.2	1.3±0.26	1.3±0.24	1.33±0.28	1.32±0.26	0.58±1.0
HCV+HBV							
Mean ± SD	1.52±0.47	1.56±0.47	1.92±1.29	1.42±0.45	1.38±0.47	1.42±0.5	1.4±1.52
P1	**0.3**	**0.3**	**0.7**	**0.9**	**0.6**	**0.6**	0.1
HCV+schist							
Mean ± SD	2.03±0.77	1.96±0.74	1.91±0.75	2.01±0.93	1.89±0.7	1.84±0.65	2.38±1.92
P2	**0.03**	**0.1**	**0.08**	**0.1**	**0.05**	**0.1**	0.03
Schist.							
Mean ± SD	1.32±0.37	1.39±0.38	1.36±0.36	1.34±0.27	1.31±0.26	1.31±0.31	0.78±0.83
P3	**0.7**	**0.5**	**0.7**	**0.5**	**0.9**	**0.9**	**0.5**

*P_1: comparison between HCV group and HCV+HBV group *P_2: comparison between HCV group and HCV+ schist. group
*P_3: comparison between HCV group and schist. group **$P < 0.05$ is significant.

Table (20): Comparison between HCV + HBV group and other studied groups before kidney transplantation

Group	albumin	bilirubin	ALT	AST	alk. phosph	proth. activity
HCV+HBV						
Mean ± SD	3.38±0.44	0.84±0.15	56.80±24.20	40.00±23.33	115.8±30.94	82.00±4.47
HCV+schist						
Mean ± SD	3.13±0.28	0.75±0.37	40.75±41.65	25.75±12.03	95.38±25.92	83.75±5.18
P1	**0.3**	**0.5**	**0.2**	**0.1**	**0.2**	**0.6**
Schistosomiasis						
Mean ± SD	3.47±0.30	0.59±0.25	30.11±18.25	17.78±5.40	73.78±39.13	90.44±4.56
P2	**0.6**	**0.06**	**0.02**	**0.004**	**0.04**	**0.01**

*P_1: comparison between HCV + HBV group and HCV+ schistosomiasis group
*P2: comparison between HCV group and schistosomiasis group
P < 0.05 is significant

Table (21): Comparison of serum creatinine between HCV + HBV group and other groups two-months after kidney transplantation

Group	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week	Creatinine 5th week	Creatinine 6th week	Creatinine 7th week	Creatinine 8th week
HCV+HBV Mean ± SD	1.28±0.24	1.28±0.22	1.38±0.3	1.34±0.25	1.34±0.25	1.44±0.34	1.56±0.44	1.6±0.48
HCV+ schist Mean ± SD	2.4±2.76	2.25±2.54	2.65±3.78	3.03±3.8	1.95±1.1	2.0±1.12	1.94±1.05	1.96±1.11
P1	**0.2**	**0.6**	**0.9**	**0.6**	**0.6**	**0.5**	**0.9**	**0.8**
Schistosomiasis Mean ± SD	1.08±0.19	1.09±0.2	1.1±0.16	1.14±0.16	1.17±0.22	1.21±0.2	1.24±0.21	1.16±0.2
P2	**0.1**	**0.06**	**0.08**	**0.2**	**0.4**	**0.2**	**0.1**	**0.04**

*P_1: comparison between HCV+HBV group and HCV+ schistosomiasis group

*P_2: comparison between HCV + HBV group and schistosomiasis group

P < 0.05 is significant

Table (22): Comparison between HCV+HBV group and other groups three-months after kidney transplantation

Group	Albumin	Bilirubin	ALT	AST	Alk. Phosph	Proth. activ	Creat 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week
HCV+HBV Mean ± SD	3.56±0.4	1.02±0.57	42.0±16.12	38±21.48	135.2±64.51	82.6±3.13	1.58±0.54	1.48±0.58	1.5±0.63	1.52±0.72
HCV+schist Mean ± SD	3.5±0.25	0.64±0.12	52±51.14	25.38±14.4	111.5±61.09	83.75±5.39	1.95±1.11	2.03±1.14	2.03±1.13	1.83±0.95
P1	**0.9**	**0.09**	**0.8**	**0.1**	**0.5**	**0.8**	**0.8**	**0.6**	**0.6**	**0.6**
Schist Mean ± SD	3.6±0.4	0.64±0.19	20.56±8.79	13.78±6.08	77±50.06	90.67±2.60	1.16±0.17	1.21±0.2	1.19±0.28	1.21±0.26
P2	**0.5**	**0.1**	**0.02**	**0.004**	**0.1**	**0.002**	**0.08**	**0.6**	**0.5**	**0.2**

*P_1: comparison between HCV+HBV group and HCV+ Schistosomiasis group

*P_2: comparison between HCV +HBV and Schistosomiasis group

P < 0.05 is significant

Table (23): Comparison of serum creatinine between HCV + HBV group and other groups 4- to 12-months after kidney transplantation

Group	Creatinine 4th month	Creatinine 5th month	Creatinine 6th month	Creatinine 7th month	Creatinine 8th month	Creatinine 9th month	Creatinine 10th month	Creatinine 11th month	Creatinine 12th month
HCV+HBV Mean ± SD	1.54±0.65	1.56±0.75	1.4±0.39	1.38±0.30	1.42±0.44	1.38±0.38	1.32±0.4	1.38±0.36	1.38±0.43
HCV+schist Mean ± SD	2.22±1.22	2.24±1.24	2.19±1.05	4.94±7.36	2.26±1.10	2.03±0.78	1.99±0.91	2.1±0.89	1.96±0.73
P1	0.4	0.3	0.09	0.06	0.07	0.1	0.1	0.07	0.2
Schist. Mean ± SD	1.28±0.23	1.2±0.17	1.21±0.17	1.24±0.25	1.28±0.27	1.28±0.29	1.3±0.29	1.3±0.27	1.33±0.29
P2	0.6	0.3	0.5	0.4	0.6	0.6	0.8	1	1

*P_1: comparison between HCV+HBV group and HCV+ schistosomiasis group

*P_2: comparison between HCV + HBV group and schistosomiasis group

***P < 0.05 is significant*

Table (24): Comparison of liver functions between HCV + HBV group and other groups 10-to 16 – months after kidney transplantation

Group	Albumin 10th month	bilirubin 10th month	ALT 10th month	AST 10th month	Alk. Phos 10th month	Proth. Activ 10th month	Albumin 16th month	Bilirubin 16th month	ALT 16th month	AST 16th month	Alk. Phosph 16th month	Proth. Activ 16th month
HCV+HBV Mean ± SD	3.9±0.20	0.78±0.3	24±7.31	29.2±23.23	94±36	87.2±4.15	3.86±0.24	0.84±0.17	33.8±32	31.4±15.95	74.8±29.25	85.6±5.37
HCV+schist Mean ± SD	3.56±0.63	0.8±0.19	24.57±13.3	18.86±5.55	104.71±61	83.57±8	3.87±0.54	0.80±0.19	34.71±31.5	23.86±13.0	90.57±44.77	84.57±5.13
P1	0.2	0.6	0.7	0.5	0.8	0.7	0.5	0.6	0.8	0.6	0.8	0.1
Schist. Mean ± SD	3.83±0.29	0.8±0.24	18±6.86	14.89±2.2	57.78±13.9	91.11±0.93	3.84±0.18	0.93±0.27	18.67±7.63	15.44±4.39	52.89±29.43	91.11±3.98
P2	0.5	0.3	0.08	0.04	0.01	0.007	0.7	0.5	0.4	0.06	0.04	0.02

*P_1: comparison between HCV+HBV group and HCV+ schistosomiasis group

*P_2: comparison between HCV+ HBV group and schistosomiasis group

****P < 0.05 is significant.*

Table (25): Comparison of serum creatinine between HCV + HBV group and other groups 13- to 18 – months after kidney transplantation

Group	Creatinine 13th month	Creatinine 14th month	Creatinine 15th month	Creatinine 16th month	Creatinine 17th month	Creatinine 18th month	Rejection no.
HCV+HBV Mean ± SD	1.52±0.47	1.56±0.47	1.92±1.29	1.42±0.45	1.38±0.47	1.42±0.5	1.4±1.52
HCV+schist Mean ± SD	2.03±0.77	1.96±0.74	1.91±0.75	2.01±0.93	1.89±0.7	1.84±0.65	2.38±1.92
P1	**0.2**	**0.4**	**0.5**	**1**	**0.2**	**0.1**	**0.4**
Schist. Mean ± SD	1.32±0.37	1.39±0.38	1.36±0.36	1.34±0.27	1.31±0.26	1.31±0.31	0.78±0.83
P2	**0.5**	**0.6**	**0.6**	**0.7**	**0.6**	**0.8**	**0.5**

*P1: comparison between HCV+HBV group and HCV+ schistosomiasis group
*P2: comparison between HCV + HBV group and schistosomiasis group

***P < 0.05 is significant.*

Table (26): Comparison between HCV + schistosomiasis group and schistosomiasis group before kidney transplantation

Group	Albumin	Bilirubin	ALT	AST	Alk. phosph	Proth. activity
HCV+schist Mean ± SD	3.13±0.28	0.75±0.37	40.75±41.65	25.75±12.03	95.38±25.92	83.75±5.18
Schist. Mean ± SD	3.47±0.30	0.59±0.25	30.11±18.25	17.78±5.40	73.78±39.13	90.44±4.56
P	**0.04**	**0.3**	**0.7**	**0.1**	**0.05**	**0.02**

P < 0.05 is significant

Table (27): Comparison between HCV + schistosomiasis group and schistosomiasis group 2-months after kidney transplantation

Group	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week	Creatinine 5th week	Creatinine 6th week	Creatinine 7th week	Creatinine 8th week
HCV+schist. Mean ± SD	2.4±2.76	2.25±2.54	2.65±3.78	3.03±3.8	1.95±1.1	2.0±1.12	1.94±1.05	1.96±1.11
Schist. Mean ± SD	1.08±0.19	1.09±0.2	1.1±0.16	1.14±0.16	1.17±0.22	1.21±0.2	1.24±0.21	1.16±0.2
P	0.01	0.01	0.02	0.09	0.1	0.1	0.2	0.09

**P < 0.05 is significant*

Table (28): Comparison between HCV+schistosomiasis group and schistosomiasis group three-months after kidney transplantation

Group	Albumin	Bilirubin	ALT	AST	Alk. Ph	Proth. activ	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week
HCV+schist Mean ± SD	3.5±0.25	0.64±0.12	52±51.1	25.38±14.4	111.5±61.09	83.75±5.39	1.95±1.11	2.03±1.14	2.03±1.13	1.83±0.95
Schist. Mean ± SD	3.6±0.4	0.64±0.19	20.56±8.79	13.78±6.08	77±50.06	90.67±2.60	1.16±0.17	1.21±0.2	1.19±0.28	1.21±0.26
P	0.3	0.8	0.09	0.03	0.1	0.004	0.2	0.2	0.1	0.2

**P < 0.05 is significant*

Table (29): Comparison of serum creatinine between HCV + schistosomiasis group and schistosomiasis group 4-to 12-months after kidney transplantation

Group	Creatinine 4th month	Creatinine 5th month	Creatinine 6th month	Creatinine 7th month	Creatinine 8th month	Creatinine 9th month	Creatinine 10th month	Creatinine 11th month	Creatinine 12th month
HCV+schist Mean ± SD	2.22±1.22	2.24±1.24	2.19±1.05	4.94±7.36	2.26±1.10	2.03±0.78	1.99±0.91	2.1±0.89	1.96±0.73
Schist. Mean ± SD	1.28±0.23	1.2±0.17	1.21±0.17	1.24±0.25	1.28±0.27	1.28±0.29	1.3±0.29	1.3±0.27	1.33±0.29
P	0.1	0.03	0.006	0.008	0.03	0.04	0.1	0.03	0.07

**P < 0.05 is significant*

Table (30): Comparison of liver functions between HCV+ schistosomiasis group and schistosomiasis group

(A) 10 - months after kidney transplantation

Group	Albumin 10th month	Bilirubin 10th month	ALT 10th month	AST 10th month	Alk. Phosph 10th month	Proth. Activ 10th month
HCV+schist Mean ± SD	3.56±0.63	0.8±0.19	24.57±13.3	18.86±5.55	104.71±61.2	83.57±8
Schist. Mean ± SD	3.83±0.29	0.8±0.24	18±6.86	14.89±2.2	57.78±13.92	91.11±0.93
P	0.5	0.2	0.4	0.1	0.005	0.04

**P < 0.05 is significant.*

(B) 16 - months after kidney transplantation

Group	Albumin 16th month	Bilirubin 16th month	ALT 16th month	AST 16th month	Alk. Phosph 16th month	Proth. Activ 16th month
HCV+schist Mean ± SD	3.87±0.54	0.86±0.19	34.71±31.46	23.86±13	90.57±44.77	84.57±5.13
Schist. Mean ± SD	3.84±0.18	0.93±0.27	18.67±7.63	15.44±4.4	52.89±29.43	91.11±3.98
P	0.4	0.9	0.2	0.1	0.03	0.01

**P < 0.05 is significant.*

Table (31): Comparison of serum creatinine between HCV + schistosomiasis group and schistosomiasis group 13-to 18- months after kidney transplantation

Group	Creatinine 13th month	Creatinine 14th month	Creatinine 15th month	Creatinine 16th month	Creatinine 17th month	Creatinine 18th month	Rejection no.
HCV+schist Mean ± SD	2.03±0.7	1.96±0.74	1.91±0.75	2.01±0.93	1.89±0.7	1.84±0.65	2.38±1.92
Schist. Mean ± SD	1.32±0.37	1.39±0.38	1.36±0.36	1.34±0.27	1.31±0.26	1.31±0.31	0.78±0.83
P	0.09	0.2	0.1	0.2	0.1	0.1	0.05

**P < 0.05 is significant.*

Table (32): Comparison between non schistosomal and schistosomal patients before kidney Tx
Comparison between non-HCV and HCV patients before kidney transplantation

Group	Albumin	Bilirubin	ALT	AST	Alk. phosph	Proth. activity
Non-schist						
Mean ± SD	3.52±0.36	0.57±0.26	32.07±20.58	26.83±15.09	87.86±45.18	87.52±6.62
SE	0.05	0.03	2.7	1.98	5.93	0.87
Schistosomal						
Mean ± SD	3.31±0.33	0.66±0.31	35.12±30.91	21.53±9.73	83.94±34.39	87.29±5.83
SE	0.08	0.08	7.5	2.36	8.34	1.41
P_1	**0.02**	**0.2**	**0.9**	**0.1**	**1**	**0.7**
Non-HCV						
Mean ± SD	3.52±0.33	0.57±0.24	28.93±18.65	23.57±12.16	85.41±45.82	87.86±6.23
SE	0.04	0.03	2.45	1.6	6.02	0.82
HCV						
Mean ± SD	3.33±0.42	0.66±0.38	46.5±32.52	32.81±18.88	91.63±31.69	86.5±7.05
SE	0.11	0.09	8.13	4.72	7.92	1.76
P_2	**0.04**	**0.4**	**0.01**	**0.02**	**0.2**	**0.3**

*P_1: comparison between non- schistosomal and schistosomal patients
*P_2: comparison between Non-HCV and HCV patients
**$P < 0.05$ is significant

Table (33): Comparison between non-schistosomal and schistosomal patients two-months after kidney Tx
Comparison between non-HCV and HCV patients two-months after kidney transplantation

Group	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week	Creatinine 5th week	Creatinine 6th week	Creatinine 7th week	Creatinine 8th week
Non-schist								
Mean ± SD	1.25±0.47	1.25±0.44	1.27±0.51	1.23±0.39	1.28±0.43	1.34±0.5	1.28±0.38	1.28±0.37
SE	0.06	0.06	0.07	0.05	0.06	0.07	0.05	0.05
Schistosomal								
Mean ± SD	1.7±1.96	1.64±1.79	1.83±2.96	2.03±2.7	1.54±0.85	1.58±0.86	1.57±0.8	1.54±0.86
SE	0.47	0.43	0.64	0.65	0.21	0.21	0.19	0.21
P_1	**0.6**	**0.9**	**0.9**	**0.7**	**0.5**	**0.5**	**0.4**	**0.9**
Non-HCV								
Mean ± SD	1.32±1.15	1.32±1.05	1.4±1.5	1.38±1.47	1.3±0.56	1.37±0.62	1.28±0.5	1.29±0.51
SE	0.15	0.14	0.2	0.19	0.07	0.08	0.07	0.07
HCV								
Mean ± SD	1.42±0.31	1.35±0.29	1.39±0.25	1.51±0.84	1.38±0.44	1.4±0.43	1.48±0.45	1.46±0.48
SE	0.08	0.07	0.06	0.21	0.11	0.11	0.11	0.12
P_2	**0.002**	**0.02**	**0.008**	**0.09**	**0.3**	**0.4**	**0.1**	**0.1**

***P_1: comparison between non-bilharzial and Bilharzial patients**
***P_2: comparison between Non-HCV and HCV patients** ****$P < 0.05$ is significant**

Table (34): Comparison between non-schistosomal and schistosomal patients three-months after kidney Tx
Comparison between non-HCV and HCV patients three-months after kidney transplantation

Group	Albumin	bilirubin	ALT	AST	Alk. Phosph	Proth. activity	Creatinine 1st week	Creatinine 2nd week	Creatinine 3rd week	Creatinine 4th week
Non-schist										
Mean ± SD	3.69±0.28	0.71±0.33	29.52±17.62	22.64±10.23	92.93±53.59	90.14±6.83	1.28±0.4	1.29±0.47	1.3±0.43	1.28±0.42
SE	0.04	0.04	2.31	1.34	7.04	0.9	0.05	0.06	0.06	0.06
Schistosomal										
Mean ± SD	3.55±0.33	0.64±0.16	35.35±38.01	19.24±12.05	93.24±56.58	87.41±5.36	1.53±0.85	1.59±0.87	1.58±0.88	1.5±0.73
SE	0.08	0.04	9.22	2.92	13.72	1.3	0.21	0.21	0.21	0.18
P_1	**0.1**	**0.5**	**0.9**	**0.09**	**0.8**	**0.3**	**0.8**	**0.2**	**0.5**	**0.5**
Non-HCV										
Mean ± SD	3.71±0.29	0.7±0.32	27.16±16.61	21.09±10.45	83.84±43.55	90.64±6.32	1.28±0.51	1.31±0.58	1.29±0.51	1.28±0.48
SE	0.04	0.04	2.18	1.37	5.72	0.83	0.07	0.08	1.2	0.06
HCV										
Mean ± SD	3.48±0.26	0.69±0.21	45.25±37.55	25.19±11.36	129.3±72.36	85.56±6.42	1.43±0.53	1.43±0.52	1.52±0.64	1.43±0.47
SE	0.07	0.05	9.39	2.84	18.09	1.6	0.13	0.13	0.16	0.12
P_2	**0.004**	**0.4**	**0.02**	**0.1**	**0.02**	**0.003**	**0.1**	**0.2**	**0.09**	**0.1**

***P_1: comparison between non-schistosomal and Schistosomal patients**
***P_2: comparison between Non-HCV and HCV patients**
****$P < 0.05$ is significant**

Table (35): Comparison between non-schistosomal and schistosomal patients 4- to 12-months after kidney Tx
Comparison between non-HCV and HCV patients 4- to 12-months after kidney transplantation

Group	Creatinine 4th month	Creatinine 5th month	Creatinine 6th month	Creatinine 7th month	Creatinine 8th month	Creatinine 9th month	Creatinine 10th month	Creatinine 11th month	Creatinine 12th month
Non-schist									
Mean ± SD	1.29±0.38	1.31±0.41	1.28±0.37	1.3±0.39	1.33±0.42	1.33±0.38	1.34±0.38	1.45±0.69	1.42±0.52
SE	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.09	0.07
Schistosomal									
Mean ± SD	1.72±0.96	1.69±0.99	1.67±0.86	2.98±5.23	1.71±0.88	1.61±0.66	1.6±0.71	1.65±0.72	1.61±0.6
SE	0.23	0.24	0.21	1.27	0.22	0.16	0.18	0.18	0.15
P_1	**0.1**	**0.2**	**0.08**	**0.05**	**0.1**	**0.1**	**0.2**	**0.1**	**0.2**
Non-HCV									
Mean ± SD	1.31±0.42	1.29±0.4	1.28±0.39	1.66±2.9	1.33±0.46	1.34±0.43	1.33±0.39	1.44±0.68	1.4±0.52
SE	0.05	0.05	0.05	0.38	0.06	0.06	0.05	0.09	0.07
HCV									
Mean ± SD	1.52±0.73	1.61±0.82	1.53±0.59	1.65±0.67	1.71±0.8	1.55±0.56	1.63±0.68	1.67±0.74	1.67±0.59
SE	0.18	0.2	0.15	0.17	0.2	0.14	0.17	0.19	0.15
P_2	**0.6**	**0.1**	**0.03**	**0.02**	**0.02**	**0.1**	**0.08**	**0.2**	**0.04**

*P_1: comparison between non- schistosomal and schistosomal patients
*P_2: comparison between Non-HCV and HCV patients
**P < 0.05 is significant

Table (36) A: Comparison between non-schistosomal and schistosomal patients 10- months after kidney Tx
Comparison between non-HCV and HCV patients 10- months after kidney transplantation

Group	Albumin 10th month	Bilirubin 10th month	ALT 10th month	AST 10th month	Alk. Phos 10th month	Proth. Activ 10th month
Non-schist						
Mean ± SD	3.87±0.35	0.78±0.28	22.88±18.1	20.35±11.8	91.3±46.36	90.56±5.92
SE	0.05	0.04	2.4	1.56	6.14	0.78
schistosomal						
Mean ± SD	3.71±0.47	0.8±0.21	20.88±10.3	16.63±4.36	78.3±46.66	87.81±6.4
SE	0.12	0.05	2.58	1.09	11.66	1.6
P_1	**0.1**	**0.2**	**0.9**	**0.1**	**0.1**	**0.6**
Non-HCV						
Mean ± SD	3.89±0.35	0.79±0.28	20.9±14.95	18.96±9.97	83.82±43.3	90.82±5.32
SE	0.05	0.04	1.98	1.32	5.73	0.7
HCV						
Mean ± SD	3.64±0.45	0.76±0.2	27.94±21.4	21.56±13.2	105.1±54.5	86.88±7.69
SE	0.11	0.05	5.34	3.29	13.62	1.92
P_2	**0.01**	**0.5**	**0.08**	**0.2**	**0.1**	**0.02**

***P_1: comparison between non-schistosomal and schistosomal patients**
***P_2: comparison between Non-HCV and HCV patients**
****$P < 0.05$ is significant**

Table (36) B: Comparison between non-schistosomal and schistosomal patients 16- months after kidney Tx
Comparison between non-HCV and HCV patients 16 - months after kidney transplantation

Group	Albumin 16th month	Bilirubin 16th month	ALT 16th month	AST 16th month	Alk. Phosph 16th month	Proth. Activ 16th month
Non-schist						
Mean ± SD	3.95±0.26	0.76±0.21	23.6±17.91	21.05±12.7	76.37±39.25	90.25±5.38
SE	0.03	0.03	2.37	1.68	5.2	0.71
schistosomal						
Mean ± SD	3.86±0.37	0.9±0.24	25.69±22.24	19.13±9.84	69.38±40.45	88.25±5.5
SE	0.09	0.06	5.56	2.46	10.11	1.37
P_1	**0.3**	**0.02**	**0.9**	**0.7**	**0.2**	**0.4**
Non-HCV						
Mean ± SD	3.97±0.25	0.79±0.24	20.54±12.9	18.88±8.29	72.18±39.28	91.09±4.61
SE	0.03	0.03	1.71	1.1	5.2	0.61
HCV						
Mean ± SD	3.78±0.36	0.78±0.19	36.56±29.32	26.88±19.8	84.31±39.29	85.25±5.84
SE	0.09	0.05	7.33	4.94	9.82	1.46
P_2	**0.04**	**0.9**	**0.01**	**0.08**	**0.1**	**0.002**

***P_1: comparison between non-schistosomal and schistosomal patients**
***P_2: comparison between Non-HCV and HCV patients**
****P < 0.05 is significant**

Table (37): Comparison between non-schistosomal and schistosomal patients 13- to 18-months after kidney Tx
Comparison between non-HCV and HCV patients 13- to 18-months after kidney transplantation

Group	Creatinine 13th month	Creatinine 14th month	Creatinine 15th month	Creatinine 16th month	Creatinine 17th month	Creatinine 18th month	Rejection no.
Non-schist							
Mean ± SD	1.41±0.54	1.46±0.53	1.47±0.72	1.44±0.53	1.46±0.58	1.5±0.65	0.98±1.19
SE	0.07	0.07	0.1	0.07	0.08	0.09	0.16
Schistosomal							
Mean ± SD	1.63±0.66	1.64±0.62	1.6±0.62	1.64±0.71	1.56±0.56	1.54±0.54	1.53±1.62
SE	0.17	0.15	0.15	0.18	0.14	0.14	0.39
P_1	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.5**	**0.2**
Non-HCV							
Mean ± SD	1.42±0.55	1.45±0.55	1.46±0.73	1.42±0.54	1.46±0.58	1.48±0.64	1.03±1.31
SE	0.07	0.07	0.1	0.07	0.08	0.09	0.17
HCV							
Mean ± SD	1.61±0.61	1.64±0.55	1.63±0.58	1.68±0.68	1.59±0.56	1.64±0.53	1.25±1.29
SE	0.15	0.14	0.14	0.17	0.14	0.13	0.32
P_2	**0.3**	**0.1**	**0.07**	**0.1**	**0.2**	**0.1**	**0.4**

***P_1: comparison between non-schistosomal and Schistosomal patients**
***P_2: comparison between Non-HCV and HCV patients**
****$P < 0.05$ is significant**

Table (38) Correlation between pretransplant parameters and serum creatinine in all patients

Parameter	Creat 1st W	Creat 2nd W	Creat 3rd W	Creat 4th W	Creat 5th W	Creat 6th W	Creat 7th W	Creat 8th W	Creat 9th W	Creat 10th W	Creat 11th W	Creat 12th W	Creat 4th m	Creat 5th m	Creat 6th m
Age coeff	0.370	0.321	0.341	0.304	0.319	0.22	0.286	0.284	0.336	0.353	0.375	0.298	0.298	0.306	0.292
P	**0.0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	**0.001**	**0.001**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.001**
Albu.nin coeff	-0.226	-0.149	-0.195	-0.168	-0.125	-0.144	-0.178	-0.212	-0.171	-0.172	-0.193	-0.158	-0.128	-0.191	-0.109
P	**0.007**	**0.07**	**0.02**	**0.04**	**0.1**	**0.08**	**0.03**	**0.01**	**0.04**	**0.04**	**0.02**	**0.06**	**0.1**	**0.02**	**0.2**
Bilirubin coeff	0.107	0.07	0.107	0.098	0.126	0.08	0.104	0.176	0.173	0.083	0.082	0.09	0.106	0.141	0.074
P	**0.2**	**0.3**	**0.2**	**0.2**	**0.1**	**0.3**	**0.2**	**0.04**	**0.04**	**0.3**	**0.3**	**0.2**	**0.2**	**0.1**	**0.3**
ALT coeff	0.04	-0.006	0.059	0.086	0.026	0.044	0.104	0.123	0.064	0.07	0.098	0.08	0.018	0.046	0.05
P	**0.5**	**0.9**	**0.4**	**0.2**	**0.7**	**0.5**	**0.2**	**0.1**	**0.4**	**0.3**	**0.2**	**0.3**	**0.8**	**0.5**	**0.5**
AST coeff	0.042	0.03	0.089	0.037	0.027	0.029	0.078	0.107	0.048	0.002	0.047	0.006	-0.033	0.004	0.01
P	**0.6**	**0.6**	**0.2**	**0.6**	**0.7**	**0.7**	**0.3**	**0.1**	**0.5**	**0.9**	**0.5**	**0.9**	**0.6**	**0.9**	**0.8**
Alk.ph coeff	0.006	-0.05	-0.04	-0.086	-0.176	-0.107	-0.079	-0.01	-0.105	-0.099	-0.083	-0.105	-0.16	-0.117	-0.112
P	**0.9**	**0.5**	**0.5**	**0.2**	**0.03**	**0.1**	**0.3**	**0.9**	**0.2**	**0.2**	**0.3**	**0.2**	**0.05**	**0.1**	**0.1**
Proth.act coeff	-0.22	-0.133	-0.167	-0.159	-0.126	-0.078	-0.158	-0.192	-0.101	-0.11	-0.141	-0.113	-0.107	-0.157	-0.164
P	**0.01**	**0.1**	**0.05**	**0.07**	**0.1**	**0.3**	**0.07**	**0.02**	**0.2**	**0.2**	**0.1**	**0.1**	**0.2**	**0.07**	**0.06**
PCR-C coeff	0.307	0.226	0.266	0.167	0.099	0.077	0.164	0.162	0.144	0.11	0.165	0.151	0.04	0.161	0.211
p	**0.002**	**0.02**	**0.008**	**0.09**	**0.3**	**0.4**	**0.1**	**0.1**	**0.1**	**0.2**	**0.09**	**0.1**	**0.6**	**0.1**	**0.03**

W: week **M: month** ****P < 0.05 is significant**

Table (38) Correlation between pretransplant parameters and serum creatinine in all patients (cont'd)

Parameter	Cr.7th m	Cr.8th m	Cr.9th m	Cr.10th m	Cr.11th m	Cr.12th m	Cr.13th m	Cr.14th m	Cr.15th m	Cr.16th m	Cr.17th m	Cr.18th m
Age coeff	0.268	0.288	0.197	0.229	0.182	0.173	0.119	0.167	0.1	0.135	0.124	0.077
P	**0.001**	**0.001**	**0.02**	**0.007**	**0.03**	**0.04**	**0.1**	**0.04**	**0.2**	**0.1**	**0.1**	**0.3**
Albumin coeff	-0.159	-0.126	-0.073	-0.092	-0.112	-0.148	-0.121	-0.089	-0.089	-0.098	-0.068	-0.057
P	**0.06**	**0.1**	**0.3**	**0.2**	**0.1**	**0.08**	**0.1**	**0.3**	**0.2**	**0.2**	**0.4**	**0.5**
Bilirubin coeff	0.117	0.061	0.036	0.079	0.098	0.058	0.09	0.033	0.039	0.01	0.021	0.046
P	**0.1**	**0.4**	**0.6**	**0.3**	**0.2**	**0.5**	**0.2**	**0.7**	0.6	**0.8**	**0.8**	**0.5**
ALT coeff	0.06	0.09	0.00	0.029	0.055	0.087	0.053	0.08	0.089	0.044	0.034	0.059
P	**0.4**	**0.2**	**0.9**	**0.7**	**0.5**	**0.3**	**0.5**	**0.2**	**0.2**	**0.6**	**0.6**	**0.4**
AST coeff	0.032	-0.007	-0.048	0.00	-0.009	0.028	-0.018	0.035	-0.013	0.004	-0.017	0.038
P	**0.7**	**0.9**	**0.5**	**1**	**0.9**	**0.7**	**0.8**	**0.6**	**0.8**	**0.9**	**0.8**	**0.6**
Alk.ph coeff	-0.064	-0.04	-0.12	-0.093	-0.093	-0.055	-0.054	0.02	-0.03	-0.067	-0.081	-0.057
P	**0.4**	**0.6**	**0.1**	**0.2**	**0.2**	**0.5**	**0.5**	**0.8**	**0.7**	**0.4**	**0.3**	**0.4**
Proth.act coeff	-0.153	-0.09	-0.092	-0.133	-0.122	-0.082	-0.068	-0.156	-0.105	0.093	-0.142	-0.158
P	**0.08**	**0.3**	**0.3**	**0.1**	**0.1**	**0.3**	**0.4**	**0.08**	**0.2**	**0.2**	**0.1**	**0.07**
PCR-C coeff	0.232	0.224	0.143	0.176	0.118	0.199	0.103	0.143	0.18	0.159	0.120	0.147
p	**0.02**	**0.02**	**0.1**	**0.08**	**0.2**	**0.04**	**0.3**	**0.1**	**0.07**	**0.1**	**0.2**	**0.1**

W: week M: month **P < 0.05 is significant

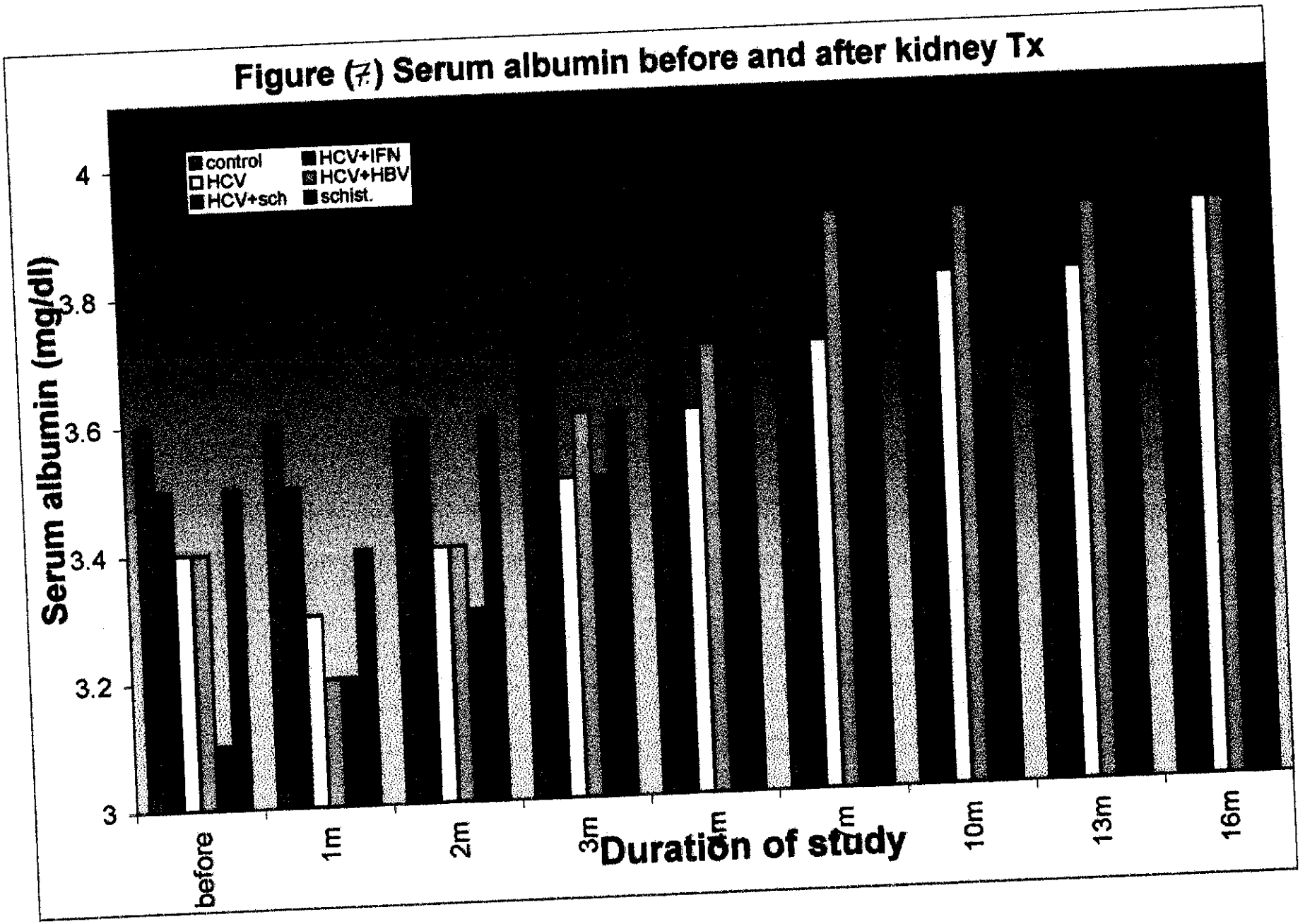


Figure (7) Serum albumin before and after kidney Tx
control
HCV
HCV+sch
HCV+IFN
HCV+HBV
schist.
Serum albumin (mg/dl)
4
3.8
3.6
3.4
3.2
3
before
1m
2m
3m
4m
7m
10m
13m
16m
Duration of study

Figure (8) Serum bilirubin before and after kidney Tx

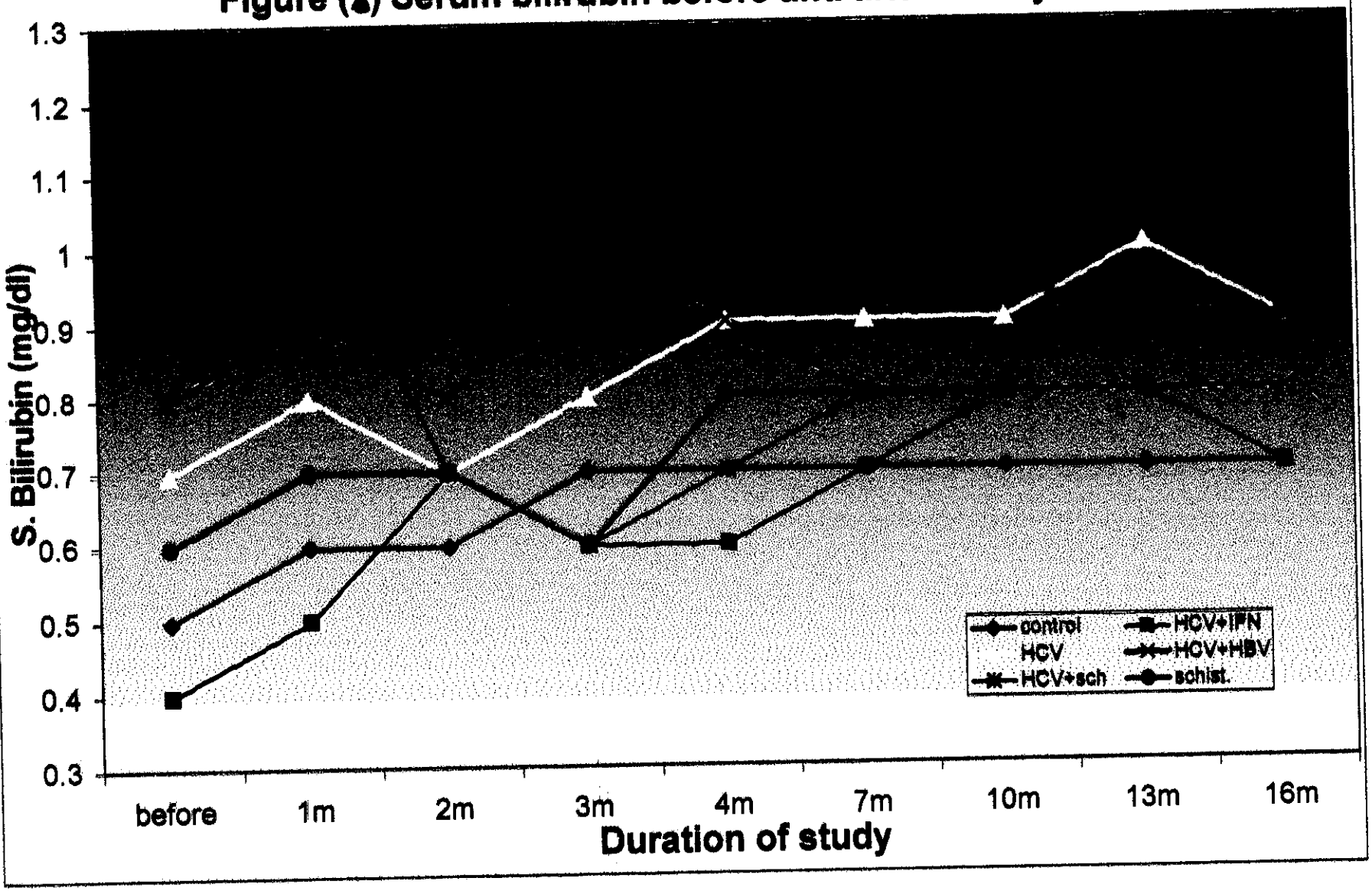


Figure (9) Serum ALT before and after kidney Tx

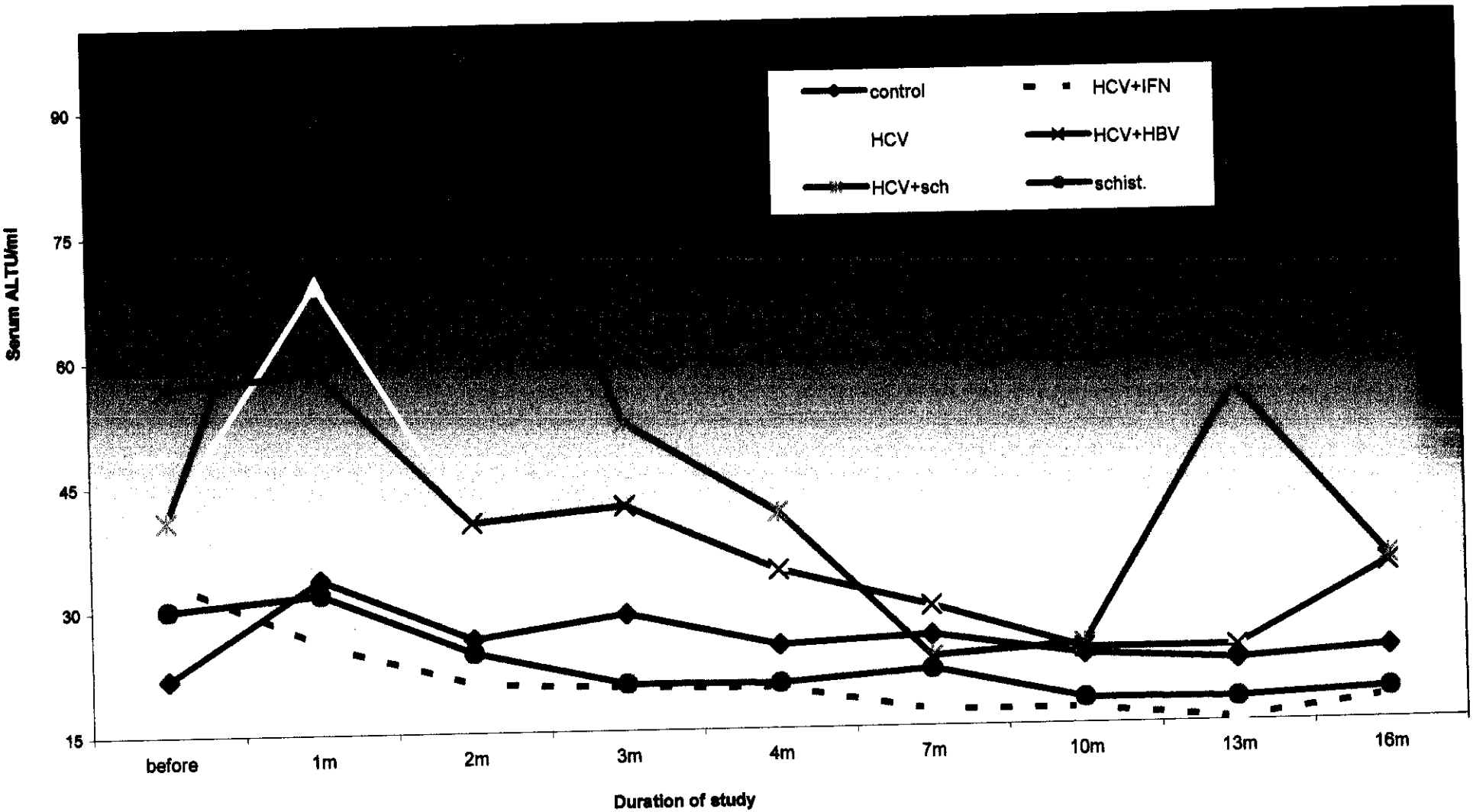


Figure (11) Serum alk. phosphatase before and after kidney Tx

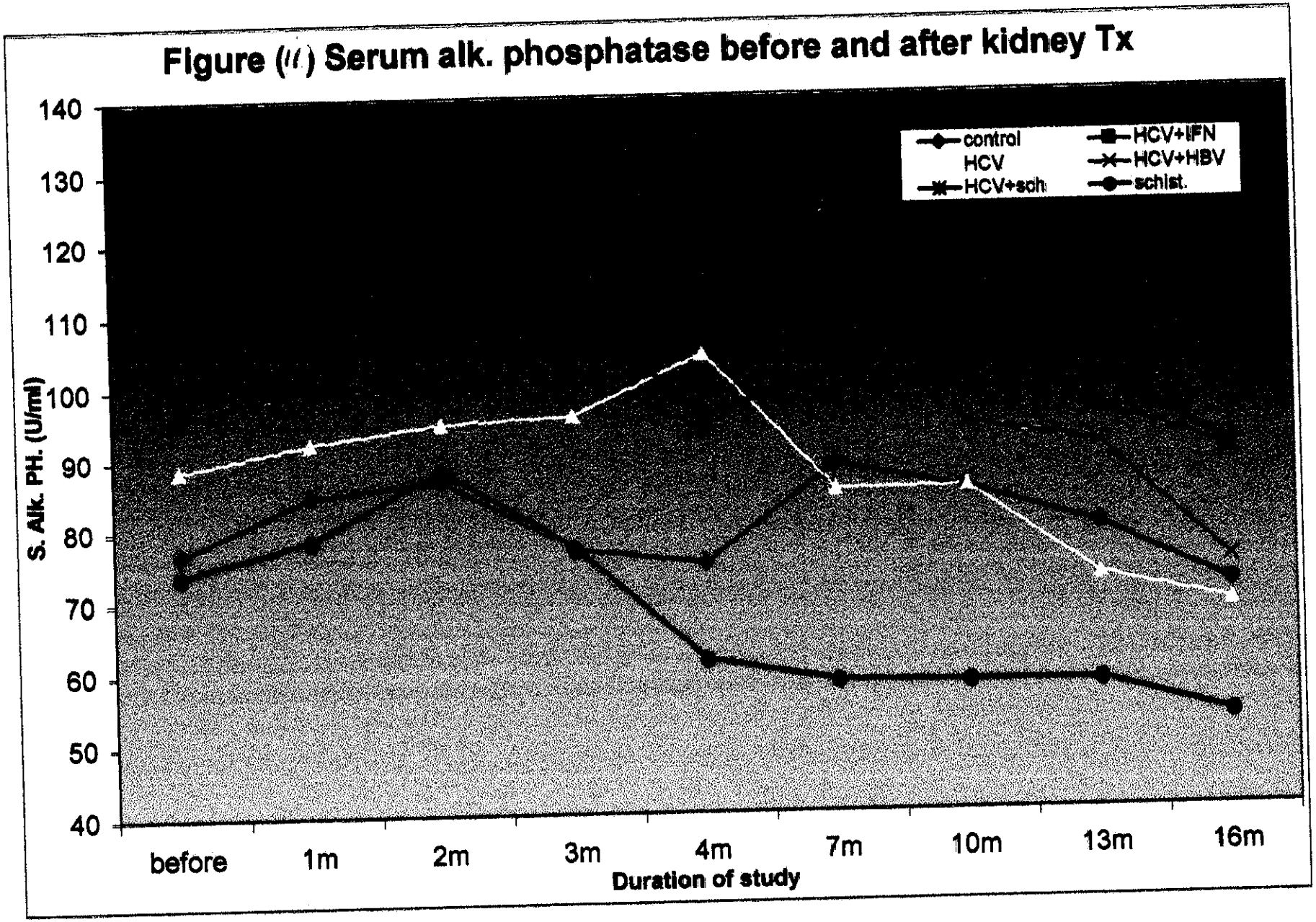


Figure (12) Prothrombin activity before and after kidney Tx

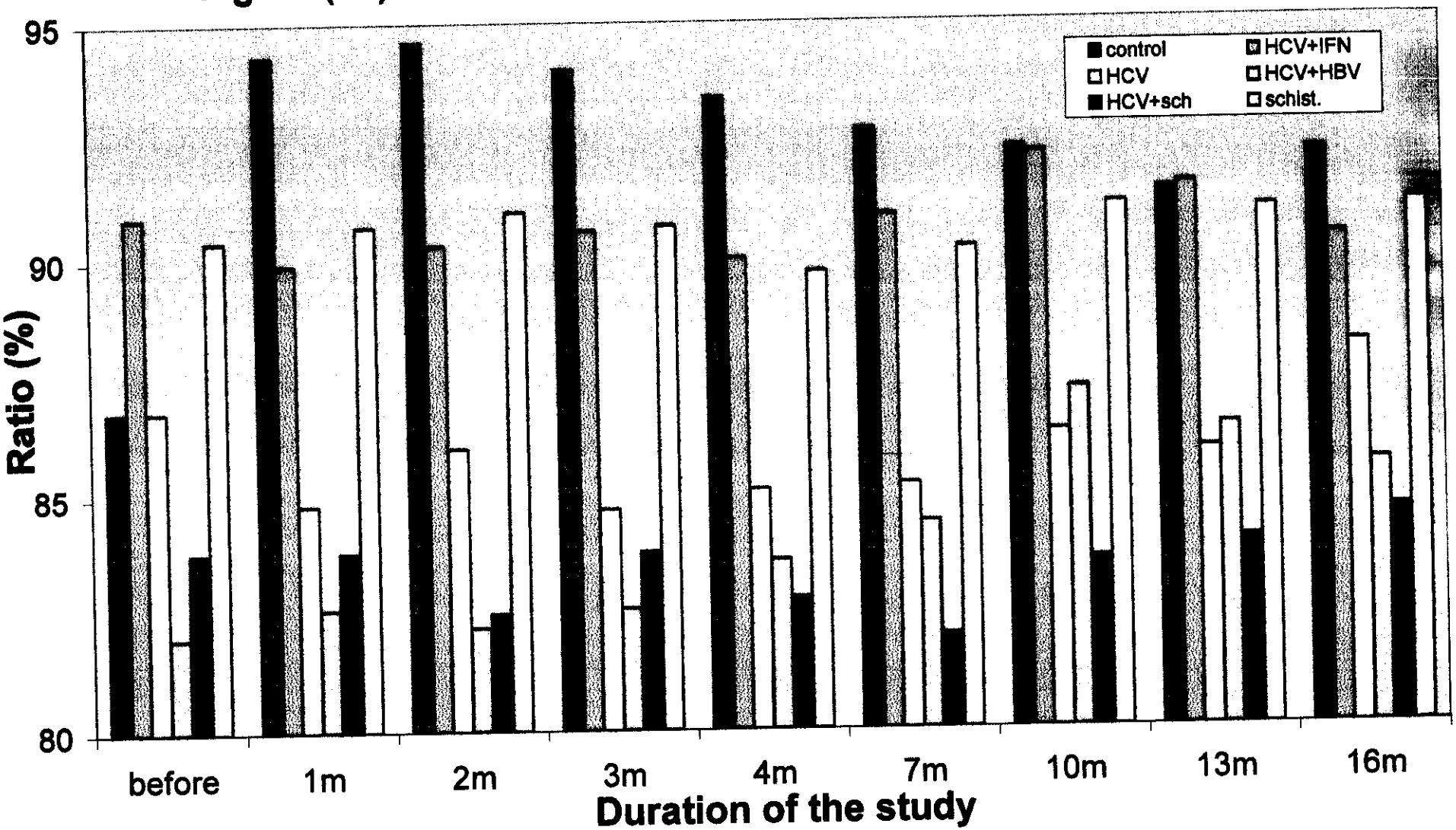
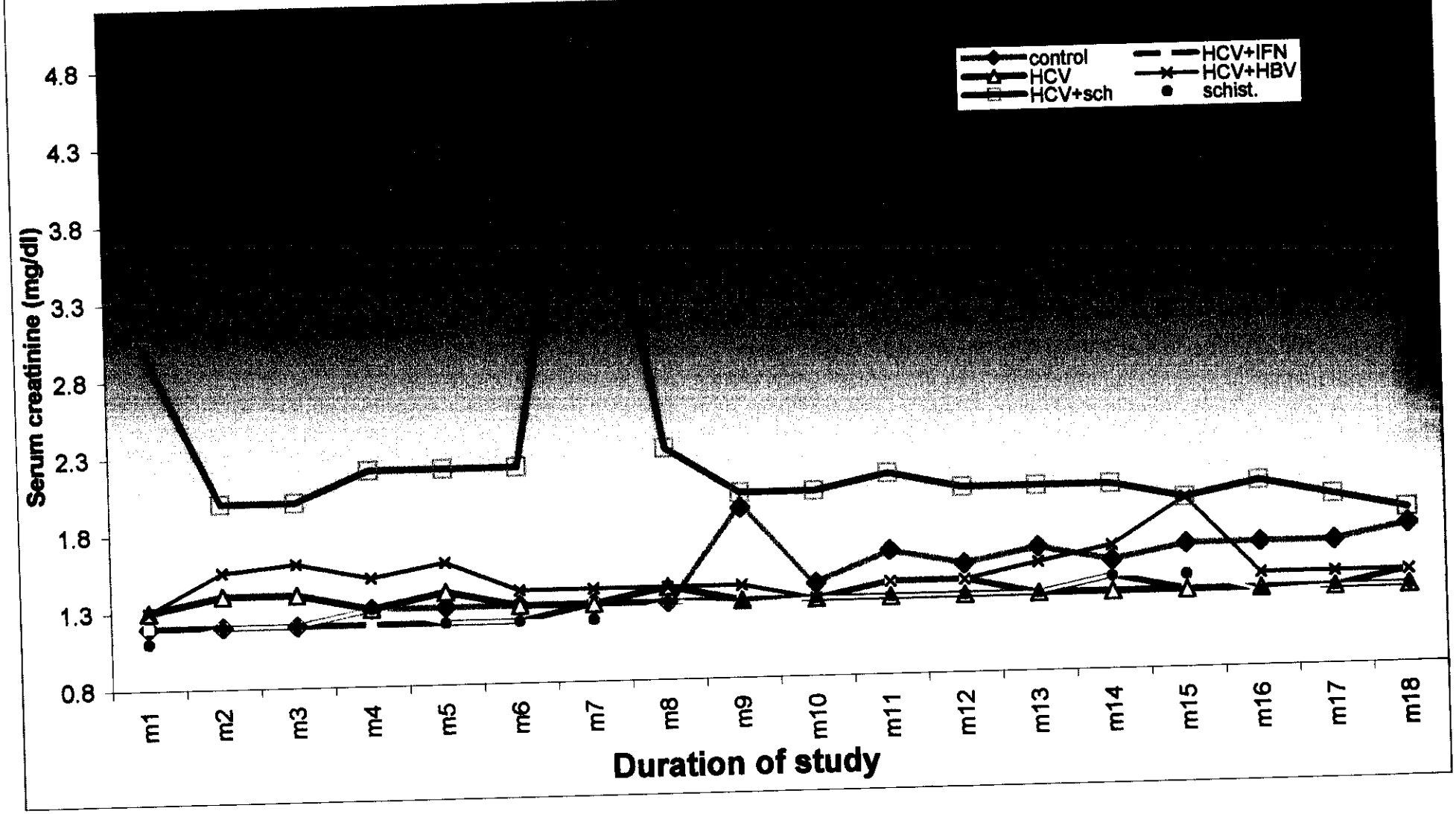


Figure (13) Serum creatinine after kidney transplantation



Discussion

Discussion

Liver disease is an important cause of morbidity and mortality after kidney transplantation. It is one of the leading causes of death in long-term survivors after renal transplantation *(Rodicio and Morales, 1995 and Pereira, 1993)*. Chronic liver disease is a frequent complication affecting about 15 % of renal allograft recipients. Infection with hepatitis B and C viruses is the predominant cause of hepatic dysfunction in these patients *(Rao and Ma, 1996)*. In the past, hepatitis B was by far the leading cause of liver disease after renal transplantation. Currently, infections caused by HBV have decreased in transplant population due to routine serologic screening for hepatic viruses, improved infection control, and the use of hepatitis B vaccine *(Rao et al., 1991)*. However, hepatitis C virus infection is currently the main cause of chronic liver disease in this group *(Rodicio and Morales, 1995 and Pereira, 1993)*. The risk of developing chronic liver disease after renal transplantation is mainly related to the duration and severity of pretransplant liver disease, the histopathologic findings, the presence of anti-hepatitis B core antigen, the time after transplantation, and the type and degree of immunosuppression *(Moake, 1994 and D'Amico and Fornasieri, 1995)*. Patients with hepatitis B and hepatitis C coinfection have more aggressive liver disease than patients with HCV infection only *(Vosnides, 1997; Morales et 1998)*. Measures to prevent hepatitis B are therefore indicated in HCV patients.

Transplant recipients are potentially at risk of developing post-transplantation hepatitis C from progression of preexisting hepatitis infection acquired prior to transplantation usually from blood transfusions or community acquired transmission. Also, they can acquire hepatitis infections at the time of transplantation from blood products, or organs from infected donors *(Esteban et al., 1990, Pereira et al., 1991, Pereira, 1992, and Aeder et al., 1993)*. *Madayag et al., (1997)* in their study suggested that HBc Ab positive kidneys can be safely used if transplanted into appropriate recipients

as no cases developed clinical HBV infection. However, ***Pfaff and Blanton (1997)*** studied the effect of HBV antigenemia and survival after renal transplantation and found patient survival for HBs Ag negative recipients is 91.8% at one year, 80.6% at 5 years and 65.8% at 10 years while patient survival for HBs Ag positive recipients was 88.8% at one year, 77.6% at 5 years, and 61.6% at 10 years. The difference in graft survival was nearly 3% between HBs Ag positive and negative recipients. The statistical significance for patient survival was p=0.02. They suggested that hepatitis B antigenemia without added and related risk factors as diabetes mellitus, recipient age, or recipient race has only a mild effect on graft and patient outcome.

Kidney transplantation-as reported by ***Huang (1997)*** is associated with increases in HBV replicative markers. The long-term complications in HBs Ag-positive recipients usually did not become apparent until 8 years after transplantation. He recommended hepatitis B vaccine for all susceptible dialysis patients.

Barrou et al., (1997) reported that the outcome of 20 kidney transplants who were infected with S. haematobium, was retrospectively evaluated. They concluded that, patients with schistosomal infection are suitable recipients for transplantation, although they are at risk for urological complications. Unlike other infectious diseases, such as tuberculosis, the risk for recurrence due to reactivation of chronically hosted pathogens seems to be low or absent in patients who received antischistosomal chemotherapy at the pre-transplant evaluation. Long term urological follow up is recommended because of increased risk of bladder malignancy.

Hepatic cirrhosis and clinically active hepatitis due to HBV or HCV infection clearly contraindicate kidney transplantation. More controversial is the attitude to be adopted towards candidates with clinically quiescent chronic HBV or HCV infection ***(Goffin et al., 1995)***.

The current study describes a cohort of 75-end stage renal disease (ESRD) patients on regular hemodialysis planned for allograft kidney

transplantation. They had been followed up prospectively at Mansoura Urology and Nephrology Center from the pre- to post-transplant period.

The purpose of this study was to study and clarify the effect of pretransplant liver dysfunction and the nature of liver disease on the short-term outcome of renal transplantation in patients with chronic renal failure.

All groups were matched for age, sex distribution and weight to provide similarity between groups. The exclusion criteria for this work were any patient with modified child scoring more than 7 (Child B or C) or sonographic evidence of shrunken liver, advanced portal hypertension or tense ascites.

In the hepatic patients of our study, 38 % (19/50) had hepatomegaly, and 16 % (8/50) had splenomegaly.

In interferon (HCV+IFN) group; the study started by 22 patients; 6 out of them did not transplant due to variable causes and excluded from the study of them one patient showed complete IFN intolerance (more than 80 % of the doses were not given) and 3 cases showed partial intolerance (50 % of IFN-α doses were not given). So IFN-α was discontinued in the 4 cases. As observed, tolerance to IFN-α was much better than that reported for non-uremic population. These data are similar to that reported by ***Josep et al., (1999)*** while are contra directory to what had been reported by ***Koeing et al., (1994) and Izopet et al., (1997)***. At the end of treatment, the initial response rate to IFN-α was 77.3 % (17/22). However, sustained response for more than 6 months had been achieved in 15 cases (68.2 %). These 2 cases showed seroconversion of HCV RNA to positive but still with normal liver enzymes during the follow up period.

Our findings are comparable with those of other workers ***(Josep et al., 1999)*** who have demonstrated that IFN-α treatment was effective in most dialysis patients. However, the higher sustained response noted in our patients could be related to different demographic, racial and clinical features of the patients or short duration of infection as most patients catched HCV infection while on dialysis. Sixteen patients underwent kidney transplantation in our

center, of them 12 cases were HCV RNA negative. However, at the end of the study; 11 cases still negative and only one patient turn HCV RNA positive. None of the 4 pretransplant positive HCV RNA turned negative emphasizing the previously reported persistence of HCV infection despite the absence of abnormalities in liver function *(Aeder et al., 1993 and Ehab et al., 1997)*. We can not detect surely the reason of the positive seroconversion of this patient, as it may be reactivation of the pretransplant HCV infection *(Campistol, 2000)* or new post-transplant HCV infection.

Alfurayh et al., (2000) found a sustained negative serocovesion in HCV hemodialysis patients of about 72 % after IFN-α therapy for one year. Also, *Biedunkiewicz et al., (2000)* observed good sustained virological (62%) and biochemical (75 %) response to IFN-α therapy in HCV hemodialysis patients. However, *Kissinger et al., (2000)* found poor response with 3 MU IFN-α course (10-30 %). Therefore, they used 5 MU IFN-α 3 times weekly for 24 weeks. In primary response, treatment was continued with 3 MU 3 times weekly for further 24 weeks. They found sustained response in 68 % compared to 28 % in non-uremic HCV positive patients. They attributed this high-sustained response to prolonged half-life of IFN-α in uremic patients.

Moreover, in HCV group (not treated by IFN) one patient turned seropositive by the end of the study which is in agreement with that reported by *Ehab et al., (1997).*

Renal transplantation with the administration of the immunosuppressive drugs facilitates HCV replication, aggravating or accelerating liver lesions *(Campistol, 2000)*.

We found highly significant positive correlation between serum creatinine and patient age. So, the serum creatinine was higher in older than younger patients.

Sharifian et al., (1999) reported that pediatric renal allograft survival as well as graft survival after 15 years follow up were 82 % and 68 % respectively. Moreover, *Fouda et al., (1999)* reported that one year patient and graft survival were 93 % and 90 %, while 5-year actuarial survival were 81 %

and 74 % respectively in pediatric renal transplant recipients. However, ***Bonal et al (2000)*** studied renal transplantation in elderly. His main purpose is to analyze the advantages of renal transplant in patients over 65 years. They found that survival of elder renal transplant patients was better than those on hemodialysis of the same age.

In our study, 44 % (11/25) of control group did not experience rejection episodes during the whole period of study versus 46 % (23/50) of hepatic group, 4 % experienced more than 3 rejection episodes in both control and hepatic groups. Acute rejection episodes were diagnosed by fine needle aspiration cytology or graft biopsy when the cytology was not conclusive. Chronic graft rejection was diagnosed by graft biopsy.

One patient of the control group died from life threatening pneumonia. Also, one patient of the hepatic patients died from cardiopulmonary failure, pleural effusion and severe adult respiratory distress syndrome. ***Rao and Ma (1996)*** suggested that chronic viral hepatitis could suppress host immune response, which could increase the risk of life threatening infection particularly in renal allograft recipients who are also under immunosuppression therapy.

No cases reported in our study with liver cell failure in post-transplant follow up period. All cases had normal range of prothrombin activity (>75%).

The impact of HCV on native kidney and renal allograft is controversial. The harmful effects of HCV in native kidney as well as renal allograft were observed. ***Jeong et al., (1998)*** reported 3 cases of membranoproliferative glomerulonephritis (MPGN) in HCV positive but cryoglobulin-negative patients presenting massive proteinuria; 2 in native kidneys and 1 in an allograft. Histopathological examination revealed that HCV RNA was associated not only with a greater amount of immune deposits, but also with subepithelial and intramembranous deposits indicating the role of active infection.

Also, ***Hesham et al., (2000)*** reported 4 cases of membranous nephropathy. They were anti- HCV positive, HBV negatives and three of them were HCV RNA (by PCR) positive among 93 children previously diagnosed as primary glomerulonephritis. Moreover, ***Sawsan (2000)*** reported that HCV infeection is more common in Egyptian nephrotic children in comparison to healthy children.

Again, ***Otha et al., (1999)*** reported glomerular deposition of HCV core antigen in HCV-related nephropathy. Also, they found mesangial proliferative glomerulonephritis in 52 % (9/17), membranoproliferative glomerulonephritis in 6 % (1/17) and nephrosclerosis in 6 % in HCV-related nephropathy patients. Again, they found exacerbation of proteinuria and / or hematuria during IFN therapy for HCV and concluded that IFN may exacerbate the underlying glomerulopathies unrelated to HCV antigens but through direct or indirect effects on glomerular endothelial and epithelial cells.

In the post-transplant follow up of our patients, HCV+IFN group and schistosomiasis group had a normal serum creatinine level in comparison to the control group during the whole period of study. Also, the number of rejection episodes in both groups was non-significantly lower than the control ($P>0.05$).

Khaled et al., (1999) reported that no significant difference in serum creatinine and incidence of early and late acute rejection in schistosomal renal allograft recipient patients versus non-schistosomal patients up to 10 years after kidney transplantation. They attributed these findings to higher doses of cyclosporin needed for schistosomal patients. The high doses of Cs A required for these patients may be due to decreased bile flow and intestinal absorption of cyclosporin in schistosomal patients ***(Takaya et al. 1987)***. So, the occurrence of cyclosporin nephrotoxicity was higher in their patients. Also, ***Sobh et al., (1992)*** found no significant difference in the incidence of acute and chronic rejection in schistosomal and non-schistosomal renal transplant patients.

However, in our study all patients were primarily immunosuppressed with tripple drug therapy consisting of prednisolone, azathioprine and cyclosporin A (CsA). Prednisolone was given according to a fixed protocol developed in our center with the lowest maintenance dose is 0.15 mg / kg / day being reached 9 months after kidney transplantation. Azathioprine was given at a dose of 1-2 mg / kg / day. Target CsA whole blood trough levels were 200 – 400 ng / ml in the first month pos-transplant and 100-150 ng / ml thereafter.

However, the occurrence of cyclosporin nephrotoxicity in our patients was nil. So, our good results can be attributed to clearance of the HCV viremia by IFN prior to transplantation, small number of the schistosomal patients and relatively short follow up duration (18 months) in comparison to 10 years by khaled and his colleagues (1999).

Diagnosis of acute cyclosporin nephrotoxicity was suggested by increase in serum creatinine with a plateau > 25% of basal creatinine level in absence of graft tenderness and fever. Diagnosis was confirmed if whole blood trough cyclosporin level was above 250 ng / ml. Also, by fine needle aspiration biopsy. In case of acute cyclosporin nephrotoxicity, the aspirate showed toxic tubulopathy in the form of inclusion bodies in tubular epithelial cells, isometric vacuolization where tubular cells contain densely packed and empty free lipid vacuoles of equal size ***(Mihatsch et al., 1985).*** Graft biopsy was indicated if FNAB was insufficient to diagnose cyclosporin nephrotoxicity. Biopsy specimen shows also findings of toxic tubulopathy.

Diagnosis of chronic cyclosporin nephrotoxicity was suspected by gradual increases in serum creatinine and proteinuria in urine analysis and 24-hour urinary protein estimation. Diagnosis was confirmed by graft biopsy showed morphological changes in the form of arteriolopathy, and / or stripped interstitial fibrosis associated with tubular atrophy in the renal cortex ***(Klintmalm et al., 1984).*** The details of criteria of cyclosporin nephrotoxicity were described in ***Patients and Methods***

Our HCV patients (not treated by IFN) showed non-significant elevation of serum creatinine during the first post-transplant 8 months (except mildly significantly higher in the 7th week, P<0.05). Surprisingly, from the 9th month to the end of our study serum creatinine of HCV group was non-significantly lower than control group (P>0.05). Moreover, the number of rejection episodes was non-significantly lower than control group (P>0.05). These findings are in agreement with ***Ehab et al., (1997), Bouthot et al., (1997), Rao and Ma (1996). Mosconi et al., (1999)*** found no difference in renal function, graft survival, and patient survival at 6 months, 12 months, and 6 years after kidney transplantation. Also, ***Sharaf-Eldin et al., (2000)*** found no significant difference in patient and graft survival at one and five years posttransplant in HCV positive renal allograft recipients versus control patients.

However, ***Cosio et al., (1996)A*** found that HCV positive renal transplant recipients had a high prevalence of severe acute pathologic changes in their allografts early after transplantation (P<0.0005). Furthermore, chronic vascular rejection also occurs more commonly in HCV positive recipients and develops earlier after transplantation than HCV negative recipients.

Again, these findings were confirmed by ***Cosio et al., (1996)B***. The pathogenesis of MPGN and MGN in HCV-positive graft recipients involves deposition of HCV-containing immune complexes that may seem paradoxical in immunosuppressed patients ***(Morales et al., 1997)*** and / or due to viral induced pathogenic process that affects primarily glomerular endothelial cells ***(Cosio et al., 1996 B)***. Moreover, the post-transplant immunosuppression accelerates viral replication ***(Legendre et al., 1998)***. Periods of rapid viral replication are associated with high circulating levels of particular cytokines such as interferon (IFN-α) ***(Levin and Hahn, 1982)*** which has been observed clinically that administration of IFN-α to renal allograft recipients can trigger acute rejection episodes and / or renal graft dysfunction ***(Kovarik et al., 1998)***.

Rosha et al., (1999) found that HCV positive patients had significantly worse patient and graft survival than HCV negative renal allogarft recipients and

attributed this to the longer duration of dialysis, greater amount of blood transfusions, more regrafting, and more pretransplant chronic liver disease in their patients.

Morales and Campistol, (2000) observed 15 patients with membranous glomerulonephritis (MGN) in HCV-positive graft recipients. Histology resembled idiopathic MGN, except for the presence of interstitial and vascular lesions due to chronic rejection. Patients presented with nephrotic proteinuria without cryoglobulinemia, hypocomplementemia, or rheumatoid factor. The clinical course was similar to idiopathic de novo MGN posttransplantation. The prevalence of MGN was higher in HCV-positive (15 of 409; 3.6%) than in HCV-negative patients (6 of 1636; 0.36%) ***[Morales et al., 1997]***.

Baid et al., (1999) stated that HCV infection may also be associated with de novo thrombotic microangiopathy and acute transplant glomerulopathy in the graft and with anticardiolipin antibodies. This complication was observed soon after transplantation and often was fatal. This newly recognized association might have deleterious consequences for the patients and graft survival as 80 % of patients died within 5 years post-transplant.

HCV infection may be associated with several immune-mediated disorders ***(Cacoub et al., 2000)***, especially type I membranoproliferative GN (MPGN) with or without cryoglobulinemia and, less frequently, membranous GN (MGN) ***(Johnson et al., 1993)***. These lesions may appear in HCV-RNA-positive patients without severe liver disease. They may affect native kidneys ***(Johnson et al., 1994)*** or renal allografts ***(Roth, 1995 and Morales et al., 1997)***.

Liver function tests in our HCV patients after renal transplantation showed non-significant difference than the control group (except in lower serum albumin and prothrombin activity although both were within the normal ranges).

Goffin et al., (1995) reported that liver biochemical abnormalities, serological markers, and detection of HCV RNA are of little value to identify patients at risk of poor outcome after renal transplantation. Again, ***Sayed et al.,***

(1998) reported that biochemical liver functions are not significantly different in post- than in pre-transplantation in HCV positive patients. Moreover, they noticed no relation between level of liver enzymes and degree of liver pathology. Also, ***Rostaing et al., (1998)*** reported that liver enzymes are not a good surrogate marker for liver disease in HCV positive renal transplant patients.

In our study, mixed HCV+HBV infection group (5 patients) showed non-significant lower serum albumin, highly significant higher serum bilirubin (0.84 ±0.15mg/dl, P=0.005), ALT (56.8±24.2 U/ml, P=0.003), AST (40±23.3 U/ml, P=0.006) and alkaline phosphatase (115.8±24.2U/ml, P=0.04) in pretransplant period than the control group. After kidney transplantation, no significant difference in serum creatinine than control group, but number of rejection episodes was non-significantly higher than control group.

Pouteil Noble et al., (1995) attributed deterioration in liver function after renal transplantation in patients of mixed HBV+HCV infection to the deleterious effect of immunosuppressive therapy.

Concomitant HBV and HCV infection in renal allograft recipients was studied by ***Durlik et al., (1996).*** They found that chronic liver disease developed in 40.7 % of coinfected patients compared to 24.4 % and 25.7 % of patients infected only with HCV or HBV respectively.

Rao and Ma (1996) analyzed the incidence of acute rejection in 86 patients infected with HBV and HCV and developed clinical evidence of chronic liver disease versus 1283 control patients who were transplanted and had no evidence of chronic hepatitis. They found nonsignificant higher incidence of graft rejection in hepatitis group versus control group.

Again, ***Younossi et al., (1999)*** studied the impact of infection with hepatotropic viruses (HBV and HCV) on morbidity and mortality and allograft function in 15 renal transplant recipients with renal allografts were functioning for more than 20 years and concluded that HBV and HCV infected renal

transplant patients for twenty years have a high rate of active viral replication, a greater frequency of diabetes and higher overall mortality from non hepatic causes especially coronary heart diseases.

Moreover, ***Sharma et al., (1999)*** in India studied the influence of hepatitis C and B viruses on patient survival after kidney transplantation. They found that patient survival in HBV and HCV groups at one and four years significantly less than uninfected patients did. Also, they found that graft survival at 4 years in HBs Ag positive group was significantly less than uninfected group. Moreover, 40 % of patients with chronic HBV or HCV hepatitis died from liver cell failure.

Again, ***Chan et al., (2000)*** reported exacerbation of HBV-related liver disease after renal transplantation and attributed this deterioration to the effect of immunosuppressive therapy.

In our study, mixed HCV+ schistosomiasis patients showed unfortunately bad results. Only 25 % of cases did not experience rejection, 25 % of cases showed 2 episodes in each patient, and 50 % of cases showed more than 2 episodes in each patient during the period of study. One patient is lost due to cardiorespiratory failure, pleural effusion and acute respiratory distress syndrome. Their serum creatinine was markedly elevated than the control and other groups (ranging from 1 to 12 mg / dl, with mean value 2.5 mg/dl). Mean serum creatinine reached its peak in the 7^{th} month (4.94 mg/dl). Number of rejection episodes was nearly double control group (2.38 versus 1.24) but it is non-significant due to high standard deviation.

According to our knowledge, no previous reports about the effects of mixed schistosomiasis and HCV infection in renal allograft recipients.

These findings may be due to the double stroke to the renal graft; HCV and schistosomiasis. Both are immune system modulators. ***Chan et al., (1999)*** studied peripheral blood lymphocytes, natural killer (NK) cells and activation markers by flow cytometry in renal allograft recipients with or without HCV compared with control. They found that peripheral blood suppressor /

cytotoxic T lymphocytes are increased, whereas activated helper / inducer T lymphocytes and NK cells are reduced in HCV positive renal allograft recipients. These data support the possibility of the immune-induced harmful effect of HCV.

The concept of schistosoma-specific glomerulopathy was introduced only two decades ago. Glomerulonephritis can be induced by experimental infection with *S. mansoni* and *S. japonicum* in guinea pigs, mice, rats, rabbits, monkeys, chimpanzees, baboons, and other animals ***(Barsoum, 1998).*** However, experimental infection with *S. haematobium* has only been associated with mesangial amyloid deposits and not with glomerulonephritis ***(Sobh et al. 1991).***

Clinical reports of schistosoma-associated glomerulopathy in patients infected with *S. mansoni* ***(Andrade and Rocha 1979)***, *S. japonicum* ***(Chandra-Shekkar and Pathmanathan 1987)***, and *S. haematobium* ***(Ezzat et al. 1974)*** appear in the literature from South America, Africa, and the Far East. The clinical spectrum varies from an asymptomatic mesangial hyperplasia to end stage renal failure.

The epidemiological impact of the syndrome is uncertain. While it was reported in autopsy and clinical studies to affect 12 to 15 per cent of patients with schistosomal hepatic fibrosis in Brazil ***(Andrade et al.1971; Rocha et al. 1976)***, it was considered to have a potential pathogenetic role in up to 74 per cent of patients with proliferative glomerulonephritis in Egypt ***(Ezzat et al. 1974; Barsoum 1993)***. The role of schistosomiasis in the pathogenesis of 'steroid-resistant' nephrotic syndrome, which is highly prevalent among children in Black Africa, remains to be elucidated ***(Barsoum, 1998)***.

The disease is encountered clinically as occult, overt, or end stage glomerulopathy. Little is known about the factors that define the severity of glomerular lesions. Species and strains of the parasite, associated infections, racial and genetic host factors, and the degree of associated hepatic involvement seem to have an important role in this respect ***(Barsoum 1987)***.

Eosinophilia, elevated IgE levels, and mastocytosis characterize immune responses triggered by schistosomiasis *(Actor et al., 1993)*. These responses are controlled by cytokines or interleukins (IL) produced by CD4 lymphocytes belonging to the Th-2 subset of CD4 cells (i.e., IL-4, IL-5, IL-10). The Th-2 cytokines simultaneously down regulate cytokines characteristic of the Th-1 subset of CD4 cells (i.e., IL-2 and interferon gamma). Th-1 cytokines are primarily responsible for the successful clearance of viral infections *(Actor et al., 1993 and Rosenberg et al., 1997)*. Inhibition or down regulation of Th-1 activity may cause accelerated progression of viral infection.

Circulating immune complexes may be responsible for distinct syndromes in schistosomiasis, namely glomerulonephritis, and cryoglobulinaemia. IgM immune complexes have been consistently identified in the sera of such patients, who have usually been exposed to *S. japonicum* or *S. mansoni* infections. Mesangial and subendothelial deposits of schistosoma-specific immune complexes are detected in the glomeruli within a few weeks of experimental infection of both small *(Natali and Cioli 1976; de Water et al. 1988)* and large *(Tada et al. 1975)* animals, in asymptomatic patients with *S. mansoni* infection *(Sobh et al. 1988a)* and in subjects recently infected with *S. haematobium (Ezzat et al. 1978)*. The glomerular response is mainly mesangioproliferative. Endothelial swelling and proliferation are more frequently seen in experimental models than in humans. Epithelial reactions, leading to the formation of crescents and adhesions, have been described occasionally.

Nahmias et al., (1993) observed a broad range of immune dysregulation in HIV-seronegative Ethiopian immigrants infected with ascariasis, hookworm, or schistosomaisis who showed elevated cytokine levels indicative of a Th-2 response. Another group found lowered Th-1 cytokine responses in mice with experimental S. mansoni infections *(Actor et al., 1993)*. Such observations suggest that helminth infections have the potential to adversely influence immune responses to viral infection especially HIV. However,

except for case reports and serologic surveys in areas endemic for both HIV and helminth infections, there are no convincing clinical, epidemiologic, or immunologic associations shown between HIV infection and intestinal helminth infections. ***(Plourde, 1997)***.

Moreover, schistosomal antigen presentation is associated with activation of the macrophages, which release IL-1, IL-6, and tumour necrosis factor. The subsequent secretion of IL-2, interferon-γ, and possibly other lymphokines by activated TH_1 cells amplifies macrophage activation, particularly during the early phases of infection ***(Barsoum, 1998)***.

Interferon secretion is increased in cases of HCV infection (Actor et al., 1993) as well as in schistosomal infection (Barsoum, 1998). Can we suspect that interferon secretion is markedly increased in cases of mixed Schistosomal and HCV infection, which may augment their effects on the Kidney? More studies may be needed to answer this question with measurements of serum interferon (if possible) in these patients.

Also, can we apply these observations of immune modulating effects of schistosomiasis towards HCV infection in this situation? To answer this question, this needs follow up of large number of patients, well-prepared immunology and virology laboratories, and more prolonged follow up period.