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ORIGINAL ARTICLE

Renal Affection in Philadelphia Negative Myeloproliferative Neoplasms

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Abstract

Background: ***Rare clonal neoplastic illnesses of the myeloid hematopoietic stem cells (HSC) that might impact other body systems are known as classical Philadelphia chromosome-negative myeloproliferative neoplasms (MPN).***

Aim and objectives: ***To assess the frequency of renal affection in myeloproliferative neoplasms that are Philadelphia negative.***

Patients and methods: A prospective study that includes 60 patients (their age above 18 years old) with Aphiladelphia negative myeloproliferative neoplasms to asses renal affection by history taking, clinical evaluation, laboratory evaluation, and pelvis. The US. From January 2023 to December 2023. All patients will be selected from the Internal Medicine Department (at both Al Hussein and Cairo University Hospitals) and outpatient clinics, with appropriate consent to participate in this study.

Results: ***There were statistically significant elevations in B. urea, Uric acid, alb. Creat. The ratio in patient groups (Where p values are 0.001 >, 0.003, and 0.001 > respectively), with a statistically significant reduction in GFR (P value 0.01). Interestingly, there was no significant difference in s—creatinine levels (0.07). Urinary albumin excretion and Urinary Uric acid excretion were significantly higher in patient groups. In all instances, the PMF group experienced the most impressive change.***

Conclusion: ***Increased JAK2 mutant allele burden in MPN patients is associated with a greater risk of CKD and adverse dynamics of renal function over time. These findings provide credence to the hypothesis that the biology of MPN disease may have a role in the declining kidney function seen in a significant proportion of MPN patients.***

Keywords: Renal affection; Philadelphia; Negative myeloproliferative; Neoplasms

1. Introduction

The myeloid hematopoietic stem cells (HSC) are rare clonal neoplastic diseases known as classical Philadelphia chromosome-negative myeloproliferative neoplasms (MPN). These conditions are categorized as primary myelofibrosis (PMF), which is characterized by excessive bone marrow fibrosis and scarring; essential thrombocythaemia (ET), which is characterized by excessive platelet production; and polycythemia vera (PV), which is characterized by excessive red cell production. Pre-fibrotic myelofibrosis (Pre-PMF), a subset of patients with slight phenotypic changes from ET and a greater rate of progression to myelofibrosis (MF), is now included in the new WHO classification.[1]

Although the prognosis varies greatly, MF generally substantially reduces life expectancy compared to PV or ET. A tiny percentage of patients reach the blast phase of the illness, which manifests as acute myeloid leukemia and is frequently resistant to standard treatment.[2]

Rarely, renal involvement manifests clinically as renal insufficiency, nephrotic syndrome, and proteinuria. Both glomerulopathy and EMH can cause kidney injury. Renal EMH is distinct and can exhibit three distinct patterns.[3]

In the absence of immune-mediated glomerulonephritis, MPN-related glomerulopathy is characterized by mesangial enlargement and hypercellularity, segmental sclerosis, characteristics of chronic thrombotic microangiopathy (TMA), and intracapillary hematopoietic cell infiltration.[4]

The study aims to assess the frequency of renal affection in myeloproliferative neoplasms that are Philadelphia negative.

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2. Patients and methods

A prospective study which includes 60 patients (their age above 18 years old) with Aphiladelphia negative myeloproliferative neoplasms to asses renal affection From January 2023 to December 2023. All patients who consent to participate in this study will be chosen from the internal medicine department and outpatient clinic at the Al Hussein and Cairo University Hospitals. The following tasks will be assigned to each participant:

Comprehensive clinical examination and history, Blood pressure assessment, laboratory testing (CBC, creatinine, blood urea, uric acid, eGFR, albumin creat ratio, calcium total, ionized-LDH), pelvic ultrasound, bone marrow biopsy and aspirate using reticulin stain, BCR ABL, and JAK2 mutation.

2.1.Inclusion criteria: All patients diagnosed myelofibrosis-essential thrombocytosis-polycythemia vera based on CBC-Bone marrow aspirate and biopsy with reticulin stain-JAK2 mutation.

2.2.Exclusion criteria: Any patients have diabetes, hypertension, or any autoimmune or infectious disease affecting kidney and chronic myeloid leukemia.

2.3.Statistical analysis

The data was managed and analyzed using SPSS version 27.0. The means and standard deviations of the quantitative variables are given for both men and women. The Shapiro-Wilk test was used to determine whether the data were normal. Krulis Wallis compared the three groups for non-parametric variables. Standard deviation (SD) and mean communicate variables with a normal distribution, while the corresponding median and 25th and 75th percentiles express variables without a normal distribution. Categorical variables were subjected to the Chi-square test. If P was less than 0.05, differences were deemed significant.

3. Results

Table 1. Demographic data in the studied groups

Variables		Total patients (n=75)	Groups ET (n=30)	PV (n=19)	PMF (n= 1)	Control group (n=15)	p value
Demographic							
Age (years) Mean±SD. Median (IQR)		58.23±9.26 58 (47.00-75.00)	56.60±10.32 57.50 (47.00-65.00)	57.00±9.15 56.00 (48.00-63.00)	66.64±7.57 67.00 (62.00-75.00)	56.9±4.69 57(49-65)	0.012*
Sex n (%)	male	39 52.0%	14 46.7%	9 47.4%	7 63.6%	9 60%	0.685
	female	36 48.0%	16 53.3%	10 52.6%	4 36.4%	6 40%	

IQR: Inter quartile range , SD: Standard deviation,

p: p value for comparing between the two studied groups. *: Statistically significant at $p \leq 0.05$

The cohort's average age was 58.23 years, with a standard deviation of 9.26 years. The interquartile range (IQR) for the median age was 58 years (47.00-75.00). There were notable disparities between the groups' mean ages when compared. With a mean age of 56.60 years (IQR: 57.50-65.00), the PV group was older than the ET group (IQR: 56.00 - 63.00), the PMF group was older than the ET group (IQR: 67.00-75.00), and the control group was older than the ET group (IQR: 56.9 years).

The ages of the four groups differed statistically significantly (p=0.012*), with the PMF group being older than the other groups. The study cohort was equally divided between male and female participants in terms of gender. Notably, among the groups under study, there was a non-statistically significant difference in the distribution of male and female patients (p=0.685). There were 46.7% men and 53.3% women in the ET group, 47.4% men and 52.6% women in the PV group, 63.6% men and 36.4% women in the PMF group, and 60% men and 40% women in the control group.

Table 2. Laboratory and radiological investigation data in the studied groups.

Variables	Total patients (n=75)	Groups ET (n=30)	PV (n=19)	PMF (n=11)	Control group (n=15)	p value
Demographic						
Hemoglobin (g/dL) Mean±SD. Median (IQR)	13.28 ± 3.43 13.00 (7.30-19.00)	11.20±1.03 11.00 (10.00-12.00)	17.88±0.96 17.80 (17.00-19.00)	9.85±3.64 8.90 (7.30-13.50)	14.15±1.1 14.1 (12.3-16.2)	<0.001*
White Blood Cell Count (cells/mcL) Mean±SD. Median (IQR)	10.3±7.03 8.8 (4.50-21.00)	7.84±1.90 7.30 (6.00-9.60)	13.81±8.73 16.00 (4.50-17.50)	14.55±11.87 9.00 (4.70-21.00)	7.7±1.99 8 (4.5-11)	0.001

Platelet Count (cells/mcL) Mean±SD. Median (IQR)		530.52±374.5 423.00 (151.00 - 950.00)	787.20± 419.02 716.0 (610.0-950.0)	425.68 ± 283.34 279.0 (233.0 - 550.0)	385.00 ± 142.78 400.0 (278.0-450.0)	256.7±83.12 241 (151-409)	<0.001*
Total calcium Mean±SD. Median (IQR)		8.67±0.48 8.50 (8.20–10.20)	8.56 ± 0.23 8.50 (8.50-8.80)	8.45±0.31 8.50 (8.20-8.50)	8.45±0.32 8.50 (8.20-8.70)	9.32±0.57 9.2 (8.5-10.2)	<0.001*
Ionized calcium Mean±SD. Median (IQR)		4.57±0.21 4.50 (4.50–5.20)	4.48±0.09 4.50 (4.50-4.50)	4.48±0.09 4.50 (4.50-4.50)	4.49±0.09 4.50(4.40-4.60)	4.89±0.24 4.9 (4.6-5.2)	<0.001*
Lactate Dehydrogenase Mean ± SD. Median (IQR)		292.11± 157.04 230.00 (150.00-450.00)	33.43 ± 63.31 200.00 (199.00-311.00)	348.05 ± 103.00 330.00 (301.00-450.00)	477.27 ± 289.25 444.00 (203.00-850.00)	202.8±39.19 188 (150-277)	<0.001*
Pelvi-abdominal ultrasound Mean ± SD. Median (IQR)	H	16.77±1.05 16.00 (16.00-18.00)	18.00 ± 0.00 18.00 (18.00-18.00)	16.00±0.00 16.00 (16.00 - 16.00)	16.58±1.11 16.50 (16.00-17.50)	-	<0.001*
	S	16.83±3.08 16.00 (15.00-18.50)	14.22±0.62 14.00 (14.00-15.00)	16.56±1.82 16.00 (15.00-18.25)	20.31±3.63 19.25 (18.50-23.00)	-	<0.001*

IQR: Inter quartile range , SD: Standard deviation,
p: p value for comparing between the two studied groups. *: Statistically significant at p ≤ 0.05

Significant variations in all keys parameters, shedding light on the distinct characteristics of these myeloproliferative neoplasms and the variations of three disorders and the control group.

Hemoglobin levels differed significantly among the groups (p=0.001*). The ET group exhibited a mean hemoglobin of 11.20 g/dL (median: 11.00; IQR: 10.00-12.00), the PV group showed a mean of 17.88 g/dL (median: 17.80; IQR: 17.00-19.00), the PMF group had a mean of 9.85 g/dL (median: 8.90; IQR: 7.30-13.50), and the control group had a mean of 14.15 g/dL (median: 14.1; IQR: 12.3-16.2).

White Blood Cell Count differed significantly among the groups (p<0.001*). The ET group exhibited a mean WBCs of 7.84 g/dL (median: 7.30; IQR: 6.00-9.60), the PV group showed a mean of 13.81 g/dL (median: 16.00; IQR: 4.50-17.50), the PMF group had a mean of 14.55 g/dL (median: 9.00; IQR: 4.70-21.00), and the control group had a mean of 7.7 g/dL (median: 8; IQR: 4.5-11).

Platelet count also demonstrated significant differences across the groups (p<0.001*). The ET group exhibited a mean platelet count of 787.20 cells/mcL (median: 716.00; IQR: 610.00 - 950.00), the PV group showed a mean of 425.68 cells/mcL (median: 279.00; IQR: 233.00-550.00), the PMF group had a mean of 385.00 cells/mcL (median: 400.00; IQR: 278.00-450.00) and the control group had a mean of 256.7 g/dL (median: 241; IQR: 151-409).

Total calcium also demonstrated significant differences across the groups (p < 0.001*). The ET group exhibited a mean total calcium of 8.56 cells/mcL (median: 8.50; IQR: 8.50-8.80), the PV group showed a mean of 8.45 cells/mcL (median: 8.50; IQR: 8.20-8.50), the PMF group had a mean of 8.45 cells/mcL (median: 8.50; IQR: 8.20-8.70) and the control group had a mean of 9.32 g/dL (median: 9.2; IQR: (8.5-10.2).

Ionized calcium also demonstrated significant differences across the groups (p<0.001*). The ET group exhibited a mean ionized calcium count of 4.48 cells/mcL (median: 4.50; IQR: 4.50 - 4.50), the PV group showed a mean of 4.48 cells/mcL (median: 4.50; IQR: 4.50-4.50), the PMF group had a mean of 4.49 ± 0.09 cells/mcL (median: 4.50; IQR4.40-4.60) and the control group had a mean of 4.89 g/dL (median: 4.9; IQR: (4.6-5.2).

Lactate dehydrogenase (LDH) levels also exhibited significant differences (p<0.001*), with the ET group having a mean LDH of 233.43 (median: 200.00; IQR: 199.00-311.00), the PV group showing a mean of 348.05 (median: 330.00; IQR: 301.00 - 450.00), the PMF group having a mean of 477.27 (median: 444.00; IQR: 203.00-850.00), and the control group had a mean of 202.8 g/dL (median: 188; IQR: (150-277).

Pelvi-abdominal ultrasound parameters "H" and "S" also demonstrated significant differences among the groups (p<0.001* and p<0.001*,

respectively). The "H" parameter in the PMF group (mean: 16.58; median: 16.50; IQR: 16.00-17.50) differed significantly from the ET and PV groups. Similarly, the "S" parameter in the PMF group (mean: 20.31; median: 19.25; IQR: 18.50-23.00) showed notable distinctions from the other groups.

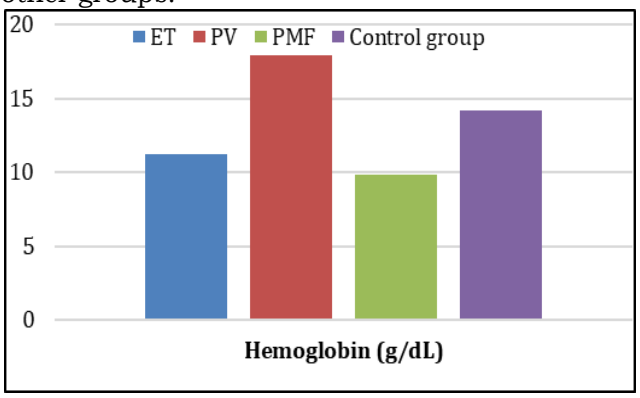

Figure 1. Hemoglobin (g/dL) between the studied groups.

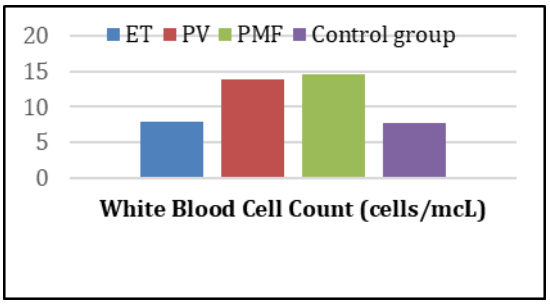

Figure 2. White Blood Cell Count (cells/mcL) between the studied groups.

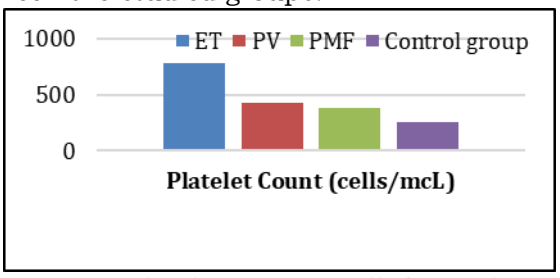

Figure 3. Platelet Count (cells/mcL) between the studied groups.

Table 3. Renal laboratory data in the studied groups

Variables	Total patients (n=75)	Groups ET (n=30)	PV (n=19)	PMF (n=11)	Control group (n=15)	p value
Demographic						
Serum Creatinine (mg/dL) Mean±SD. Median (IQR)	1.03±0.86 0.90 (0.60-1.30)	0.88±0.25 0.80 (0.80-0.90)	0.92±0.29 0.90 (0.60-1.00)	1.65±2.13 1.00 (0.84-1.30)	1.01±0.25 1.1 (0.6-1.3)	0.07
Blood Urea (mg/dL) Mean±SD. Median (IQR)	30.01±13.35 29.00 (5.00-52.00)	30.17±7.55 29.00 (25.00-30.00)	36.42±11.26 31.00 (27.00-50.00)	42.73±13.05 45.00 (30.00-52.00)	12.27±4.36 12 (5-19)	<0.001*
Uric acid (mg/dL) Mean±SD. Median (IQR)	5.51±1.56 5.80 (3.50–7.50)	4.89±1.54 4.00 (3.50 - 6.00)	5.72±1.66 6.50 (4.00-7.00)	6.87±1.14 6.80 (6.00-7.50)	5.46±1.07 5.3 (3.5-7.1)	0.003*
eGFR (mL/min/1.73 m2) Mean±SD. Median (IQR)	98.67±30.64 90.00 (72.00-130.50	105.23±28.46 100.00 (82.00-131.00)	103.21±33.29 99.00 (75.00-131.00)	104.55±38.32 100.00 (72.00 - 130.00)	75.47±9.36 73 (62-89)	0.01*
Albumin Creatinine Ratio Mean±SD. Median (IQR)	82.8±102.56 35.00 (10.00-350.00)	93.77 ± 103.99 50.00 (25.00 - 80.00)	59.47 ± 58.21 35.00 (15.00 - 80.00)	179.36 ± 150.61 120.00 (32.00 - 350.00)	19.6±6.48 17 (10-28)	<0.001*

IQR: Inter quartile range , SD: Standard deviation,

p: p value for comparing between the two studied groups. *: Statistically significant at p ≤ 0.05

Significant variations in most keys parameters, shedding light on the distinct characteristics of these myeloproliferative neoplasms and the variations of three disorders and the control group.

Serum creatinine levels showed some variability across the groups, even if the variations fell short of statistical significance (p=0.07). The mean serum creatinine for the entire cohort was 1.03 mg/dL (median: 0.90; IQR: 0.80-1.00). While the ET and PV groups had comparable levels, the PMF group exhibited slightly higher levels, with a median of 1.00 mg/dL (IQR: 0.84-1.30), and the control group had a mean of 1.01 g/dL (median: 1.1; IQR: (0.6-1.3).

Blood urea levels differed significantly among the three groups and the control group, the statistical significance was achieved (p <0.001*). The mean blood urea for the entire cohort was

34.45 mg/dL (median: 30.00; IQR: 26.00-44.00). The ET and PV groups had similar levels, while the PMF group showed a slightly higher median of 31.00 mg/dL (IQR: 27.00-50.00), while the control group had a mean of 12.27 g/dL (median: 12; IQR: (5-19).

Uric acid levels differed significantly among the three groups and the control group, the statistical significance was achieved (p=0.003). The mean uric acid for the entire cohort was 5.52 mg/dL (median: 6.00; IQR: 4.00-6.90). The PMF group exhibited a slightly higher median of 6.50 mg/dL (IQR: 4.00-7.00), while the control group had a mean of 5.46 g/dL (median: 5.3; IQR: (3.5-7.1).

There were notable variations in the three groups' estimated glomerular filtration rate (eGFR) compared to the control group (p=0.01). The mean eGFR for the entire cohort was 104.47 mL/min/1.73 m² (median: 100.00; IQR: 82.00-130.50). The ET, PV, and PMF groups displayed similar eGFR values, suggesting comparable renal function across these entities, while the control group had a mean of 75.47 g/dL (median: 73; IQR: (62-89).

The albumin creatinine ratio also differed significantly among the three groups and the control group, the statistical significance was achieved (p<0.001*). The mean albumin creatinine ratio for the entire cohort was 98.60 (median: 50.00; IQR: 20.00-150.00). The PMF group exhibited a higher median of 120.00 (IQR: 32.00-350.00), potentially indicating altered renal protein handling in this subgroup, while the control group had a mean of 19.6 g/dL (median: 17; IQR: (10-28).

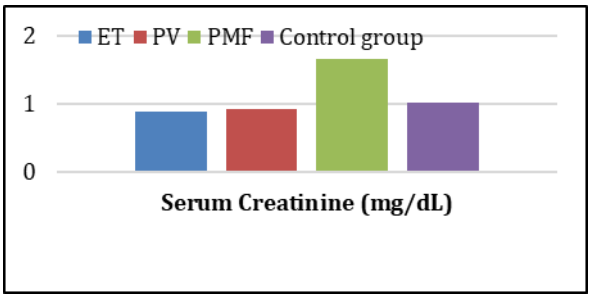

Figure 4. Serum Creatinine (mg/dL) between the studied groups.

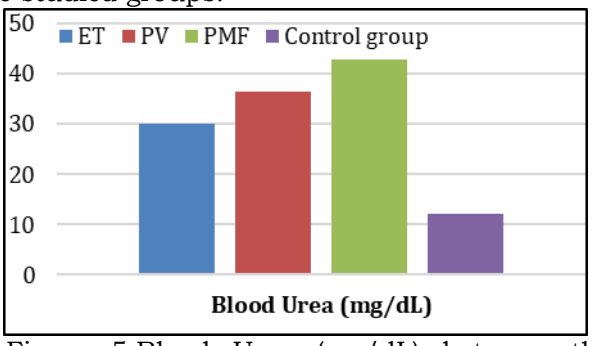

Figure 5.Blood Urea (mg/dL) between the studied groups.

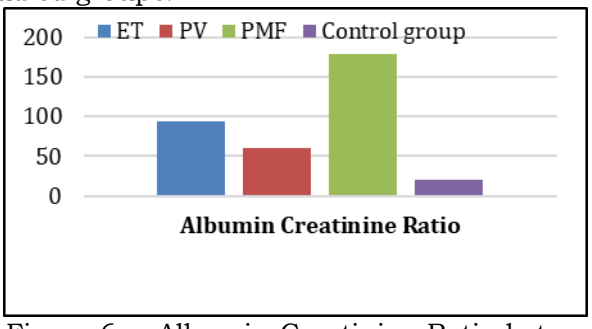

Figure 6. Albumin Creatinine Ratio between the studied groups.

Table 4. Urine analysis in the studied groups.

Variables		Total patients (n=75)		Groups ET (n=30)		PV (n=19)		PMF (n=11)		Control group (n=15)		p value
Demographic												
Normal urine analysis		57	76.0%	23	76.7%	12	63.2%	7	63.6%	15	100 %	0.06
Pus	Negative	75	100.0%	30	100%	19	100%	11	100.0%	15	100 %	
	+	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	
	++	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	
Albumin	Negative	69	92.0%	27	90.0%	19	100%	8	72.7%	15	100 %	<0.001*
	+	3	5.0%	0	0.0%	0	0.0%	3	27.3%	0	0.0%	
	++	3	5.0%	3	10.0%	0	0.0%	0	0.0%	0	0.0%	
Urate	Negative	71	94.7%	30	100%	17	89.5%	9	81.8%	15	100 %	0.097
	+	3	5.0%	0	0.0%	2	10.5%	1	9.1%	0	0.0%	
	++	1	1.7%	0	0.0%	0	0.0%	1	9.1%	0	0.0%	
Uric acid	Negative	65	86.67%	26	86.7%	13	68.4%	11	100.0%	15	100 %	0.031*
	+	3	5.0%	0	0.0%	3	15.8%	0	0.0%	0	0.0%	
	++	7	11.7%	4	13.3%	3	15.8%	0	0.0%	0	0.0%	
Oxalate	Negative	74	98.67%	30	100.0%	19	100.0%	10	90.9%	15	100 %	0.435
	+	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	
	++	1	1.7%	0	0.0%	0	0.0%	1	9.1%	0	0.0%	

p: p value for comparing between the two studied groups. *: Statistically significant at p ≤ 0.05

The majority of patients across all groups exhibited normal urine analysis results, with no significant differences observed (p=0.06). Normal urine analysis was noted in 76.0% of the total cohort, with 76.7% in the ET group, 63.2% in the PV group, 63.6% in the PMF group and 100% in the control group.

Pus analysis yielded uniformly negative results for all patients, irrespective of the myeloproliferative neoplasm under consideration. This suggests an absence of urinary tract infections across the study population.

Albuminuria, however, showed significant differences among the groups (p< 0.001*). The majority of patients in the ET and PV groups exhibited negative albumin results (90.0% and 90.0%, respectively) and 100% of control group, whereas 27.3% of patients in the PMF group demonstrated albuminuria. This discrepancy may indicate renal involvement or impaired glomerular filtration in the PMF group.

Uric acid, however, showed significant differences among the groups (p=0.031*). 100% of PMF patients and control group had negative uric acid results, while a higher percentage of ET and PV patients showed positivity for uric acid. The presence of urate and oxalate in urine did not show statistically significant differences among the groups.

Table 5. Grading of Myelofibrosis, JAK2 Mutation Analysis and BCR-ABL Analysis in the studied groups.

Variables		Total patients (n=75)		Groups ET (n=30)		PV (n=19)		PMF (n=11)		Control group (n=15)		p value
Demographic												
Grading of Myelofibrosis	grade 1							2	20.0%			
	grade 2							6	50.0%			
	grade 3							2	20.0%			
	grade 4							1	10.0%			
JAK2 Mutation Analysis	-ve negative	34	45.3%	17	56.7%	0	0.0%	2	18.2%	15	100.0%	<0.001*
	+ve positive	41	54.7%	13	43.3%	19	100.0%	9	81.8%	0	0.0%	
BCR-ABL Analysis	-ve negative	75	100.0%	30	100.0%	19	100.0%	11	100.0%	15	100.0%	
	+ve positive	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	

p: p value for comparing between the two studied groups. *: Statistically significant at p ≤ 0.05

Significant variations in the molecular and genetic features of essential thrombocythemia (ET), polycythemia vera (PV), primary myelofibrosis (PMF), and the control group.

In terms of grading of Myelofibrosis, the PMF group exhibits a diverse spectrum of myelofibrosis grades, with 20.0% in grade 1, 50.0% in grade 2, 20.0% in grade 3, and 10.0% in grade 4.

In the JAK2 mutation analysis, a significant association is observed between JAK2 mutation and myelofibrosis, particularly pronounced in the PMF group where all patients (100.0%) tested positive for the mutation. In contrast, 56.7% of ET patients and 43.3% of PV patients were positive, while 100% of the control group was negative for the JAK2 mutation. Conversely, BCR-ABL analysis yielded no positive cases across all groups.

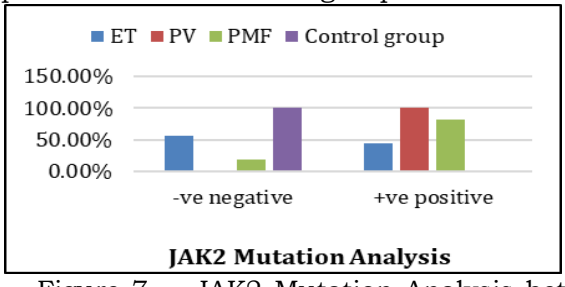

Figure 7. JAK2 Mutation Analysis between the studied groups

4. Discussion

Our results were supported by Lucijanic et al.[5] They sought to assess the relationships between the load of JAK2 mutant alleles and both baseline and dynamic renal function throughout time. Retrospectively examined a group of 230 MPN patients with JAK2 V617F mutations who were treated at the University Hospital Dubrava in Zagreb, Croatia, and for whom data on the allele load of JAK2 V617F were available. The quantitative real-time PCR 7300 Real-Time PCR System (Applied Biosystems, Foster City, California, USA) was used to evaluate the JAK2 mutant allele load. The results were compared with baseline clinical data, which included serum creatinine levels. Analysis was done on 230 MPN patients: 98 had PV, 94 had ET, 20 had PMF, and 18 had additional MPNs with mutations in JAK2. The age median was 67 years. One hundred fifteen people (50.2%) were female.

Our results agreed with Emanuel et al.[6] who stated that there was a significant difference in hemoglobin between the examined groups.

Our results supported Emanuel et al.[6] He stated that there was a significant difference in White Blood Cell Count between the groups

under study.

Our results are supported by Christensen et al.[7] who proved that there was a significant difference in LDH between the groups under study.

Our results supported with Lucijanic et al.[5] They revealed that in compared to baseline values across the board in the entire cohort, neither the JAK2 mutant allele burden nor the serum creatinine levels displayed significant dynamics at the 6- or 12-month time intervals (P>0.05 for all analyses). However, after six and twelve months (mean 2% worsening vs. 7% improvement, P=0.032) and twelve months (mean 11% worsening vs. 8% improvement, P=0.007), individuals with higher compared to lower initial mutant allele load differed significantly regarding kidney function dynamics. Kidney function improved significantly in patients with lower baseline mutant allele burden but not in patients with higher baseline mutant allele burden at either time. Dynamic changes in kidney function throughout time were similarly influenced by age (P<0.05 for the difference at both time points). In all analyses, the dynamics of kidney function over time were not substantially impacted by baseline CKD, MPN subtype, or sex (P>0.05).

Our results are supported by Lucijanic et al.[5] who proved that a higher burden of JAK2 mutant alleles in MPN patients is linked to a higher risk of chronic kidney disease (CKD) and negative dynamics of renal function over time.

Our results were supported by Lucijanic et al.[5] who showed that the baseline JAK2 mutant allele burden was 26.3% on average and that there were substantial differences amongst the MPN categories (median 47.5% in PV, 21.6% in PMF, 21.6% in other MPN, and 16.5% in ET patients, P<0.001). With 46 (24.9%) of the patients with CKD, the median blood creatinine level was 84 mmol/L. There was no significant difference in CKD between the MPN subgroups (P=0.140). The probability of CKD was higher in patients with an enormous mutant allele load stratified at the median (32.6% vs. 16.7%, P=0.012).

4. Conclusion

Increased JAK2 mutant allele burden in MPN patients is associated with a greater risk of CKD and adverse dynamics of renal function over time. These findings provide credence to the hypothesis that the biology of MPN disease may have a role in the declining kidney function seen in a significant proportion of MPN patients. Future research is necessary.

Disclosure

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