Summary:

- The current study has been performed on 80 subjects, their age ranged between 17 and 74 years (52.6 ± 13.32 years). They included 54 males and 26 females.

They were divided into 4 groups:

Group I: 30 patients with chronic renal failure on regular hemodialysis.

Group II: 10 patients with chronic renal failure on conservative measures

Group III: 20 patients with renal impairment.

Group IV: 20 normal healthy control

- Skin affection was positive in 30% of patients in group I, 50% of patients in group II, and 25% of patients in group III.
- Bone pain was positive in 33% of patients in group I, 20% of patients in group II, and 35% of patients in group III.
- Muscle wasting was positive in 10% of patients in group I, 30% of patients in group II, and there was not any patient in group III.
- Joint affection was positive in 43.3% of patients in group I, 40% of patients in group II, and 35% of patients in group III.
- Joint affection was significantly correlated to the serum silicon level in group I (r= 0.55), II (r=0.75), and III (r=0.56).
- The plasma silicon level in group I was (2588.7 ± 2114.1µg/L), in group II (2413.2 ± 1951.8µg/L), in group III (1457.6 ± 1694.3µg/L), in group IV (540.8± 559.4 µg /L). It was significantly elevated in groups I, II, and III than in group IV.
- Plasma silicon level found to be normal (i.e. less than or equal the mean silicon level in group IV) in 10 patients of the three groups.
- The plasma aluminum level in group I was (22.67 ± 9.7µg/L), in group II (18.8 ± 3.5µg/L), in group III (21.2 ± 10.5µg/L), in group

IV (13.7 ± 4.1μg/L). It was significantly elevated in groups I, II, and III than in group IV.

- In group I hemoglobin was (10.57 ± 2.11 gm/dl) and hematocrit (33.06 ± 4.8 vol%). In group II hemoglobin (9.08 ± 2.21 gm/dl), hematocrit (29.9 ± 6.6 vol%), in group III hemoglobin (10.25 ± 2.16 gm/dl), and hematocrit (31.35 ± 7.47 vol%).
- In group I, the serum calcium level was (9.37 ± 1.3 mg/dl) corrected calcium was (9.57 ± 1.37mg/dl), phosphorus was (7.16 ± 1.9 mg/dl), alkaline phosphatase was (560.8 ± 908.3 u/dl), S.G.O.T was (17.4 ± 9.6 u/dl), S.G.P.T was (21.4 ± 17 u/dl), serum albumin was (3.74 ± 0.35 gm%).
- In group II, the serum calcium level was (8.34 ± 1.56 mg/dl), corrected calcium was (8.41 ± 1.81 mg/dl), phosphorus was (7.19 ± 3.7 mg/dl), alkaline phosphatase was (144.9 ± 129.1 u/dl), S.G.O.T was (21.2 ± 12.7 u/dl), S.G.P.T was (15.5 ± 7.2 u/dl), serum albumin was (3.91 ± 0.66 gm%).
- In group III, The serum calcium level was (8.68 ± 1.78 mg/dl), corrected calcium was (9.1 ± 1.77 mg/dl), phosphorus was (5.39 ± 1.06 mg/dl), alkaline phosphatase was (132.6 ± 154.5 u/dl), S.G.O.T was (30.8 ± 22.4 u/dl), S.G.P.T was (28.7 ± 38.3 u/dl), serum albumin was (3.48 ± 0.87 gm%).
- Parathyroid hormone was (110.76 ± 184.06 Pg/ml) in group I, and was (235.1 ± 386.2 Pg/ml) in group II, while it was (354.75 ± 347.57 Pg/ml) in group III.
- There serum parathyroid hormone level was significantly suppressed in patients with high silicon (55.3 ± 23.29 Pg/ml) than those with normal silicon levels (226.67 ± 201.8 Pg/ml) in group I

($p< 0.001$), and in group III patients with elevated silicon, serum parathyroid hormone was (170.6 ± 149.39 Pg/ml) and in those with normal silicon it was (784.3 ± 291 Pg/ml) ($p< 0.002$).

- The serum parathyroid hormone was negatively correlated to plasma silicon level in group I ($r=-0.79$), group II ($r=-0.93$), and in group III ($r= -0.56$)
- Anti-nuclear antibodies: was positive in (38.5 %) of patients in group I, (25%) in group II, and (28.6%) in group III.
- Anti-double strand D.N.A: was positive in (46.2 %) of patients in group I, (25%) in group II, and (14.3%) in group III.
- Rheumatoid factor: was positive in (53.8 %) of patients in group I, (50%) in group II, and (57.1%) in group III.
- E.S.R: was elevated in (76.9 %) of patients in group I, (100%) in group II, and (100%) in group III.
- C-reactive protein: was positive in (53.8 %) of patients in group I, (50%) in group II, and (71.4%) in group III.
- ANA was significantly correlated to the serum silicon level in group I ($r= 0.80$) and II ($r=0.66$).
- There was albuminuria in (40%) of patients of group III, it was (2.91 ± 1.56 gm).

Conclusion:

The serum silicon levels are increased in both patients with chronic renal failure and those with renal impairment. The clinical relevance of increased element level deserves further investigations.

The elevated serum silicon levels in patients with chronic renal failure can be considered as uremic toxin. Since its elevated levels may increase incidence of joint affection and induce arthropathy.

The elevated serum silicon level may affect the parathyroid gland and lead to suppression of release of parathormon hormone.

The elevated serum silicon level may be associated with immunological system dysregulation as evidenced by presence of antinuclear antibodies.

In view of the controversy that exists on the assumed toxic role of silicon in the development of renal, respiratory and musculoskeletal diseases, in addition to its vital role in bone, cartilage, and connective tissue formation, monitoring of the silicon levels in serum, tap water, and dialysis fluid might become important.