Chronic kidney disease (CKD) is a condition characterized by decreased glomerular filtration rate (GFR) for more than 3 months. The estimated GFR can be calculated using the Cockcroft-Gault formula or the Modification of Diet in Renal Disease (MDRD) formula. Chronic kidney failure is a serious health issue in developed countries, with the number of people with deranged renal functions increasing rapidly. According to recent data, the number of people with CKD patients is rising due to concomitant disorders such as hypertension, cardiovascular disorders, and type-2 diabetes mellitus. CKD is associated with a number of complications like impaired physiological functions, dyslipidemia, infections, cardiovascular disorders, and affect thyroid gland.

In chronic renal failure, kidney cannot filter the blood adequately. Chronic renal failure affects thyroid gland physiology in so many ways like low level of thyroid hormone concentration, inadequate binding to carrier proteins, alteration in peripheral tissue metabolism, and decrease of thyroid hormone content in tissues. Thyroid is one of the most important glands of the body because it controls and modulates most of the normal body actions.
It produces primary hormones (tri-iodothyronine, thyroxin) that have a vital role in development, metabolism, proteins synthesis and synchronize other hormones.³

It has been seen that thyroid functions like TSH, FT4 and T3 becomes deranged in cases of advanced chronic renal disorders. Chronic kidney disease reflects thyroid hormone regulation, synthesis and metabolism.⁴

Many aspects of the kidney like its development and hemodynamics are effected by the thyroid hormone. It has been hypothesized that subclinical hypothyroidism and thyroid dysfunction occurs in advanced stage renal disease but still there is controversy on this statement. By experimental studies it has been suggested that decrease in thyroid hormone may reduce glomerular filtration rate by reducing sodium reabsorption, renal blood flow and cardiac output.⁵ Increased level of thyroid stimulating hormone has been related with decreased glomerular filtration rate and high risk of developing CKD even in euthryoid state.⁶

MATERIAL & METHODS
This was a cross-sectional descriptive study conducted at Pathology department of Bacha Khan Medical Complex Swabi from November 2018 to November 2019. Informed consent has been taken from the ethical research committee of Bacha Khan Medical Complex Swabi (GKMCs/EC/015). Sixty-five (65) CKD patients were included in this study. The sample size was calculated by open-epi software with 95% confidence interval and 5% margin of error.

Inclusion Criteria
All known CKD patients before dialysis visiting Bacha Medical Complex Swabi. Patients who were on dialysis, pregnant, known thyroid disorder and those who were taking thyroid medication were excluded. Two ml blood was drawn from the vein keeping aseptic measures. The blood was centrifuged and serum kept for analysis of TSH and serum creatinine. Thyroid function tests TSH, FT4 were measured in these chronic kidney disease patients through enzyme linked immunosorbbant assay method using abbot kit by ERBA machine. GFR was calculated through Cock-croft-Gualt formula and the relevant data was entered in a predesigned Proforma.

RESULTS
In the current study total 65 chronic kidney patients were taken. They were subdivided into male and female, thirty-six (55.4%) were male and twenty-nine (44.6%) were female. According to (Table-I) these sixty-five chronic kidney disease patients were distributed into five age groups. In first age group (20-29years) one (3%) male and four (14%) were female. In second age group (30-39 years) four (11%) male and two (7%) were female. In third group (40-49years) five (14%) male and eight (28%) were female. In fourth group (50-59 years) nine (25%) male and eleven (38%) were female. In fifth age group (60-69 years) seventeen (47%) male and four (14%) were female.

(Table-II) represents the distribution of 65 chronic kidney disease patients according to their age, serum creatinine, GFR, TSH, and FT4. Thirty CKD patients whose TSH was normal, their mean age was 50.30±12.66 (years), serum creatinine was 3.79±2.51 mg/dl, GFR was 31.59±21.29 ml/min/1.73m², TSH was 1.84±0.89 mIU/L, FT4 was 1.14±0.23 ng/dl while in the 35 patients whose TSH was above the normal limit, their mean age was 50.60±11.95 (years), serum creatinine was 4.73±2.94 mg/dl, GFR was 22.17±12.48 ml/min/1.73m², TSH was 6.68±0.87 mIU/L and FT4 was 0.97±0.35 ng/dl. P-value of TSH was <0.001 and FT4 was <0.05 in comparison with normal TSH and FT4 which were significant.

Linear regression line was obtained between GFR and TSH in CKD patients. It represents that as GFR decreased TSH was increased. It means that there was inverse relationship between GFR and TSH in chronic kidney disease patients (Figure-1).

DISCUSSION
Rhee CM. conducted a study in 2016 on the interaction between thyroid and kidney disease for which he took eighty patients. His result demonstrates that CKD affects thyroid functions.
Similarly in our study we took sixty five patients and thyroid functions are influenced by stage wise decrease in GFR of Chronic renal patients. In the present study we took the chronic kidney patients with age range from 20-65 years similarly Schultheiss, UT et; al conducted a study published in 2021. In this study he took CKD patients with age range from 18-76year. Like in our study Schultheiss, UT et; al also described in his study that there is association between higher value of TSH with lower eGFR. In the present study we saw that an increased TSH was associated with reduced eGFR. These results were similar with the previous studies. Chang et al 2018 reported that the odd ratio and 95% confidence interval of subclinical hypothyroidism for CKD was 1.74 after analyzing 74.356 patients from Taiwan. Toda et al suggested too that with 95% confidence interval TSH value is equal to 2.41-4.26 mlU/L and > 4.26 mlU/L for CKD P<0.001 in Japanese patients. However no known studies have find out the non-linear correlation between TSH and eGFR. 

**CONCLUSION**

From the results it has been concluded that chronic kidney disorder affects thyroid functions and reflects that thyroid stimulating hormone

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**Table-I. Distribution of chronic kidney disease patients by gender and age.**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>20-29</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>30-39</td>
<td>4</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>40-49</td>
<td>5</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>50-59</td>
<td>9</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>60-69</td>
<td>17</td>
<td>47</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100</td>
<td>29</td>
</tr>
</tbody>
</table>

**Table-II. Age, Serum creatinine, GFR, TSH and FT4 in chronic kidney disease patients. Mean± SD is given. Figure in parenthesis indicate number of cases in each group on the basis of TSH levels.**

<table>
<thead>
<tr>
<th>Group</th>
<th>TSH Normal (n=30)</th>
<th>TSH increase (n=35)</th>
<th>Total (n=65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>50.30±12.66</td>
<td>50.60±11.95</td>
<td>50.46±12.19</td>
</tr>
<tr>
<td>Serum creatinine (mg/dl)</td>
<td>3.79±2.51</td>
<td>4.73±2.94</td>
<td>4.29±2.77</td>
</tr>
<tr>
<td>GFR (ml/min/1.73m²)</td>
<td>31.59±21.19</td>
<td>22.17±12.48</td>
<td>26.51±17.57</td>
</tr>
<tr>
<td>TSH(mIU/L)</td>
<td>1.84±0.89</td>
<td>6.68±0.87***</td>
<td>4.45±2.59</td>
</tr>
<tr>
<td>FT4(ng/dl)</td>
<td>1.14±0.23</td>
<td>0.97±0.35*</td>
<td>1.05±0.31</td>
</tr>
</tbody>
</table>

*P< 0.05, ***P <0.001

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**Figure-1. Regression line between GFR and TSH of chronic kidney disease patients.**

Similarly in our study we took sixty five patients and thyroid functions are influenced by stage wise decrease in GFR of Chronic renal patients. Thyroid functions can be best assessed by measuring TSH level. There is inverse relationship between estimated glomerular filtration rate and thyroid stimulating hormone a study carried out by Toda A et; al 2019 and Stan MN and Drake MT in 2018. Their study results and concluding remarks matches with our study. In the present study we saw that an increased TSH was associated with reduced eGFR. These results were similar with the previous studies. Chang et al 2018 reported that the odd ratio and 95% confidence interval of subclinical hypothyroidism for CKD was 1.74 after analyzing 74.356 patients from Taiwan. Toda et al suggested too that with 95% confidence interval TSH value is equal to 2.41-4.26 mlU/L and > 4.26 mlU/L for CKD P<0.001 in Japanese patients. However no known studies have find out the non-linear correlation between TSH and eGFR.
(thyrotrophin) is inversely related to CKD. This results in biochemical subclinical hypothyroidism.

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If you live for people’s acceptance, you will die from their rejection.

Lecrae