Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE

DOI: 10.47750/jptcp.2023.1119

Studying the Level of Some Hormones in the Serum of Male Patients Infected with Corona Virus in Anbar Governorate -Iraq

Aseel J. Mohammad[1]
[1]General Directorate of Education in Baghdad, Al-Karkh First, Iraq.
Email: la_aaaa@yahoo.com

Submitted: 09 January 2023; Accepted: 08 February 2023; Published: 07 March 2023

ABSTRACT

The current study aims to determine the hormonal changes accompanying infection with the emerging corona virus with males only, in order to draw a clear picture of the effect of infection with Covid 19 on the level of four hormones and the relationship of glands to infection.

The study dealt with 150 suspected patients with corona virus who suffer from respiratory symptoms, and after conducting routine diagnostic tests, it was found that 100 patients of them were infected with corona virus, and 100 healthy people were selected as a control group.

IgM, IgG and D-dimer diagnostic tests were performed for both groups, as well as the estimation of the level of testicular lipotropic hormones and thyroid hormones TSH, T3, T4 in the study samples. An increase in testicular adipose hormones in T3 was discovered in people infected with the Corona virus while the concentration of T4 hormone did not change and remained within the normal range.

INTRODUCTION

During the outbreak of the Corona pandemic in 2019 and beyond, many physiological disorders were observed, especially the endocrine glands, as it was noted that disorders in the thyroid gland, adrenal gland disorders and other glands, which called for a comparative study between (SARS-Cov & SARS Cov-2) in terms of symptoms to know the severity of infection with the new virus (Agarwal and Agarwal, 2020). Some studies have indicated that the Corona virus causes immune stimulation by activating a pathway called (Pro-inflammatory cytokines), including (IL-6), which directly affects the activity of many endocrine glands, and the term Cytokines Storm Syndrome clearly indicates the occurrence of an immune syndrome due to the presence of the virus is ultimately due to the disruption of many of the body's systems, causing death (Croce et.al. 2021). Corona virus belongs to the corona virus family Coronavirinae, which is characterized by infecting the respiratory tract and digestive system (Khan et.al. (2019) and was first discovered in 1960, which was described as causing inflammation of the respiratory tract in humans of moderate severity and includes two types of viruses: HCOV-229E and HCOV- OC43 (Cleri et.al, 2010). At the end of the year 2019, specifically on December 30, new strains of the virus appeared, causing a new respiratory syndrome that suddenly spread in the marine fish market in Yuhan State in China and then turned into an outbreak pandemic that swept through the entire world, causing death of a number of people in more than 200 countries (Huang etal 2020). Recent studies indicated that the SARS-COV-2 virus enters the cell through an enzyme receptor called Angiotensin-Convering Enzyme-Type-2 (ACE-2), which is expressed by cells of the lungs (pneumocytes) and many gland cells, including gonand (AL-Lami et.al, 2020), so it is expected that there will be an effect on the endocrine glands, including the sex hormones.

The methods of diagnosing the virus are immunological methods used to assay IgG, IgM antibodies, and the stimulation of the immune system can be inferred by estimating the concentration of IL-6 and to determine the severity of infection of tissues and organs, so that the concentration of D-dimer is estimated (Rehman et. al., 2021). The study of Dhidsa et.al. (2021) showed a significant decrease in the levels of testicular lipid hormone concentration in people infected with the Corona virus.

A study (2021). Livingston et.al. proved that people who were infected with the Corona virus had a decrease in the concentration of testicular lipid hormone to less than 3.7 mol / liter and thus they died as a result of this decrease.

Karlberg et.al. (2004) showed that the testicular lipid hormone has a dampening effect on the immune system, as it was noted that males have a higher mortality rate due to the Corona virus than females, due to the presence of estrogen in females, which plays a major role in facing viral infections through the anti-viral effect. (Anti-inflammatory) for this with the hormone against the Corona virus.

Purdie et.al (2020) showed that the ACE2 gene is carried on the X chromosome and that it is the reason for the increase in female resistance to infection with the Corona virus, in addition to the fact that high levels of the testicular lipid hormone in males will make males worse off than females. Some studies have shown a relationship between the severity of infection with the Corona virus and the level of male and female hormones, as there was a correlation between the concentration of testicular lipid hormone and the severity of infection in males, while there was no relationship between the severity of the disease and estrogen in women.

A histological-pathological study showed the effect of the Corona virus (SARS_INFECTION) on the thyroid gland during the SARS_COV_1 pandemic. The study showed a lot of damage to the thyroid gland cells of both types (BARAFOLLICULAR AND FOLLICULAR), destroying the centers of thyroid hormone production and thus decreasing the concentration of the two hormones T3, T4 (Weiet.et.al.2007).

Corona virus infection leads to a decrease in the level of TSH hormone concentration, due to the virus's direct effect on the pituitary gland, as well as through an effect on the immune system, causing a decrease in the concentration of the hormone (Flierset.al.2015). Chen et.al (2020) indicated that the thyroid gland

axis and the pituitary-thyroid axis are directly affected by infection with the Corona virus and this affects the three hormones. T4, T3, TSH.

Bellastella, et.al. (2020) indicated that infection with the Corna virus targets the thyroid gland, causing an imbalance in its secretions and the occurrence of thyroiditis, while Bell et.al (2003) stated that TSH activates adipocytes and stimulates them to produce (IL-6), which is an immune stimulus against infection with the Corona virus.

The rapid spread of the Corona virus epidemic had a significant impact on the immune system, which in turn led to great damage to the tissues and organs of the body. Our current study aimed to study the hormonal changes accompanying infection with the Corona virus. It included diagnosing infection with the virus and then studying the concentration of testosterone and gland hormones, thyroid T3 & T4 and thyroid-stimulating hormone (TSH) and determine the extent to which they are affected by viral infection.

MATERIALS AND WORKING METHODS

Blood samples were collected from the auditors of the private laboratories in Anbar Governorate who were referred due to suspicion of being infected with the Corona virus. They were about 150 patients who were subjected to laboratory diagnostic tests. The study was conducted for the period from 1/11/2020 to 31/12/2020, and 100 healthy people were selected as a control group.

IgG, IgM antibody titration determination

The ELISA method was used to estimate the concentration of IgM, IgG antibodies in the serum of the subjects of the study. The Vidas device was used to conduct the test and the kit supplied by the French company Bio Merieux.

Determination of D-Dimer Concentration: The ELISA method was used to estimate the concentration of D-dimer in the blood plasma of the patients of the study, and a kit prepared from the French company Bio Merieux was used.

J Popul Ther Clin Pharmacol Vol 30(2): e357–e364; 07 March 2023.

Estimation of testicular lipotropic hormone concentration

The ELISA method was used to estimate the concentration of testicular lipoprotein hormone in the serum of the patients of the study using the Vidas device and the kit supplied by the French company Bio Merioux.

Determination of the concentration of the hormone T3 threonine:

The ELISA method was used to estimate the concentration of T3 threonine hormone in the blood serum of patients, using the Vidas device and the kit supplied by the French company Biomer.

T4 Thyroxine concentration determination

The ELISA method was used to change the concentration of T4 tyromycidal hormone in the blood serum of the patients using the Vidas device and the kit supplied by the French company Biomerioux.

Estimation of the concentration of thyroid-stimulating hormone (TSH).

The ELISA method was used to estimate the concentration of thyroid stimulating hormone (TSH) in the blood serum of the subjects using the Vidas device and the kit supplied by Biomeroux, France.

Statistical analysis:

The results were statistically analyzed using Excel version 2010 and the arithmetic mean was calculated for the two groups under study, and the data was represented using histograms.

RESULTS AND DISCUSSION

The results of the current study showed the presence of infection with the Corona virus in ten samples out of fifty samples that were subjected to industrial tests to detect the presence of the Corona virus, through the use of detection of IgG & IgM antibody titration for serum. Figure (1) shows the concentration level of antibodies in the studied samples It was 17, and in the control samples, its concentration was 0.8, while the concentration of IgG in the blood of infected individuals was 13, and in the control samples, its concentration was 0.6.

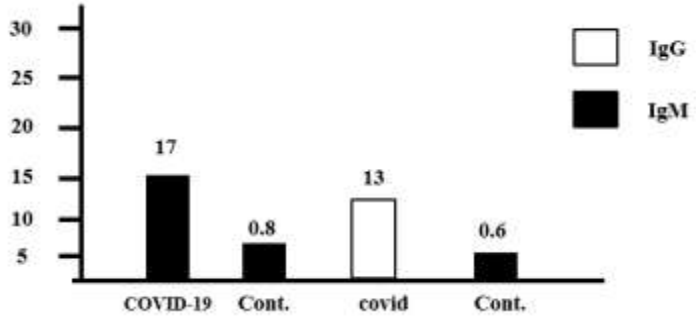

FIGURE. 1: The average concentration of IgG, IgM in the blood serum of control samples and samples of people infected with Coronavirus.

It was relied on the titration of IgM, IgG antibodies in the blood serum of individuals infected with the Corona virus, and the diagnosis was enhanced by conducting a D-dimer test in the diagnosed samples. Infected individuals, as its average concentration reached 700 ng/ml, and in the control samples, its concentration was 125 ng/ml.

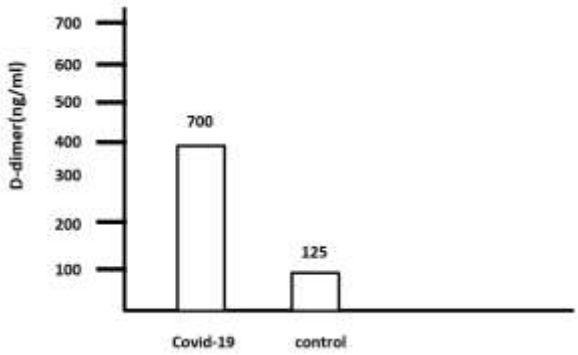

FIGURE (2-3) The concentration of d-dimer in samples of infected patients compared to the control group.

COVID-19 is a rapidly spreading epidemic disease that causes respiratory syndrome due to a protein-coated, single-stranded RNA virus that can enter the host cell via angiotensin-converging enzymez receptors (ACEZ) and for this reason Scientists have suggested that there is an effect of the virus on the glandular system, causing hormonal changes with a long-term effect (Lisco, etal.2021).

The results of our study show that the prevalence of infection with the disease in the random sample that was tested for the whole study by 10 samples out of 50 samples, or 20% of the suspected cases of the total respiratory infections, and this is due to the spread of the vaccine and the increase in vaccination cases, which leads to reducing the spread of the disease.

The ACEZ recipient is present in some endocrine tissues, including the body under stress: Hypothalamus, pituitary gland, Thyroid gland, adrenal gland, pancrease, and gonads. For this reason, the test was conducted on the subject of the study to determine the effect of infection with the Corona virus on some glands and their hormones for the purpose of determining the severity of the disease, Covid-19, on the endocrine system. There is another recipient named Trans membrane protease serine 2 (TMPRSS2).

It is an enzyme that the virus uses to enter the host cell, and it is also present in some endocrine glands, so it could be a way for the virus to affect a number of endocrine glands and their hormones (Clark, et.al.2022). The enzyme (TMPRSS2) is regulated by the gonads, and this clearly indicates the possibility of the virus affecting the sex hormones.

The D-dimer test is one of the most important diagnostic tests accompanying the identification of infection with the Corona virus. It is part of a protein formed when the body gets rid of blood clots deep in the tissues, which indicate the presence of viral infections and damage to the deep tissues. This physiological variable was tested in order to confirm infection with the virus on the one hand. And making sure that the virus has reached deep tissue areas, including the endocrine glands, and the normal value of D-dimer is less than 500 ng/ml. This confirms the presence of strong viral infections and a link to the deep tissues. (AL-Taie, et.al.2021).

The presence of viral infections at ages 25-50 years is common, as the integration of receptors on specialized cells increases with age, so we note the lack or loss of corona virus infections at young ages and this is consistent with what was found (Mahmood et.al.2022). As well as what he found (Abbas et.al.2022). The highest injuries were in the age group 25-45 years and were lowest in ages over 45 years.

The results of our current study showed a decrease in the concentration of testicular lipid hormone in the blood serum of individuals infected with Coronavirus compared to the control group. Figure (3) The concentration of testicular lipotropic hormone in the individuals of the two groups.

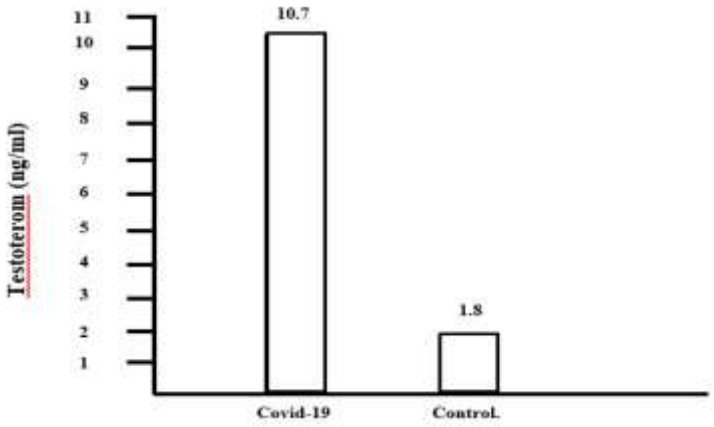

FIGURE (3) The average concentration of the testoterom hormone in the control group compared to the group infected with the Corona virus.

The results of our study showed a decrease in the concentration of testicular lipid hormone in people infected with the Corona virus, and this changes with what was found by (Okcelik (2021) in his study that he conducted on 44 samples of Covid-19 patients, as he noticed a decrease in the concentration of testicular lipid hormone in those infected with the virus. It also agrees with the study of (Muehlenbein, et.al (2010), which noted a decrease in the concentration of testicular fat hormone in patients with mental disorders in general. To many things through its effect on host immunity (Naz et .al,2021) and in Covid-19 disease, the mechanism of virus binding to receptors called Androgen Receptors, namely (TMPSS2) and (ACEZ) has been proposed and the start of attacking different tissues by the virus through these queries.

The immune suppressive role of the testicular lipid hormone against dendritic cells leads to the stimulation of immunity and activation of the T-lymphocytes pathway, thus increasing the cytokines storm that complicates infection with the Corona virus and killing infected with the virus (Rehman, et.al 2021).

From an immunological point of view, female immunity is stronger than male immunity because the immune system in females responds very efficiently to pathogens through the production of interferons and antibodies in high quantities due to the stimulating activity of estrogen. An important role in stimulating immunity from infection with the virus that causes Covid-19 disease. It stimulates immunity (Gtraziano et .al 2020).

The results of our current study agree with the study of Livingston et al. 2022. In which they observed a decrease in the concentration of testicular lipotropic hormone in patients infected with the Corona virus. Relationship Due to the presence of ACEZ receptors in the testes cells, the resulting immune response due to the cytokines storm led to the destruction of testes cells, causing death.

The results of the current study showed a decrease in the rate of the concentration of the T3 thyronine hormone in the blood serum of individuals infected with the Coronavirus compared to the control group. Figure (4) shows the average concentration of threonine hormone in the two study groups.

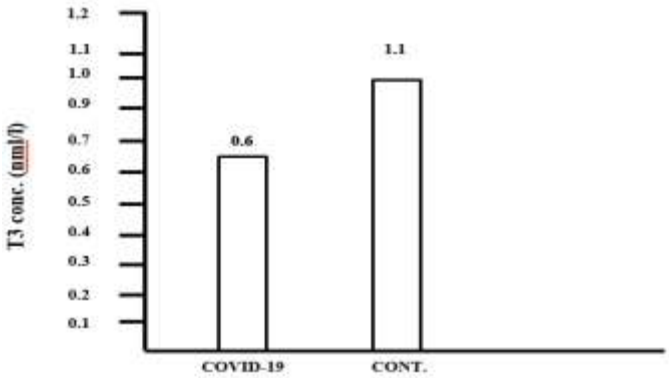

FIGURE (4) The average concentration of threonine hormone in the members of the control group compared to the group infected with Corona virus.

The results of the current study showed that there was no change in the concentration of thyroxine hormone in the blood serum of individuals infected with the Coronavirus. Thyroxide in the two study groups was within the normal values in the two groups.

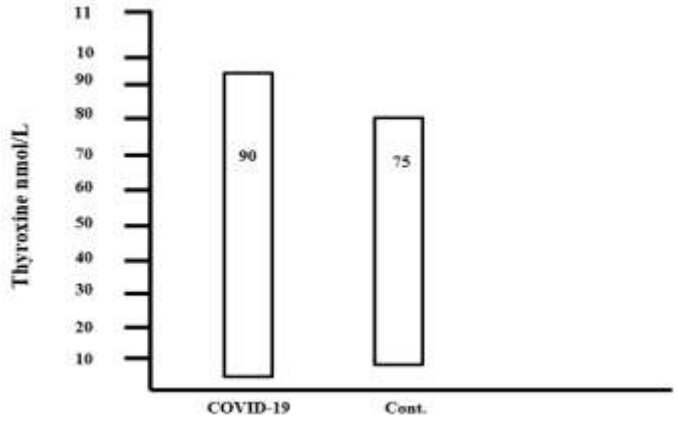

FIGURE 5 The concentration of thyroxine hormone in individuals infected with Coronavirus compared to the control group

The results of the current study showed a decrease in the concentration of the thyroid stimulating hormone (TSH) in individuals infected with the Corona virus compared to the control group. Thyroid stimulating hormone (TSH) concentration in both control and HIV-positive groups.

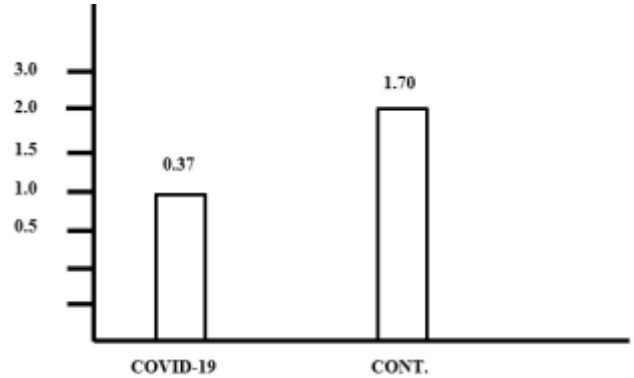

FIGURE 6: TSH concentration in the two study group.

J Popul Ther Clin Pharmacol Vol 30(2): e357–e364; 07 March 2023.

It was observed from the results of our current study that the concentration of TSH & T3 hormones decreased, while the concentration of T4 hormone did not affect the people infected with the Corona virus compared to the control group. The results of our current study are in agreement with the study (Chen et al.2020) which was conducted on 274 patients with SARS-COV2, where a significant decrease in the concentration of TSH & T3 hormones was observed, while the changes in the concentration of T4 did not have a significant effect and also consistent with Wang's study. et.al2003. A decrease in the concentration of TSH, T4T3 hormones was observed in patients infected with SARS-COV-2 virus, and a positive correlation was observed between the concentration of T3 and the severity of infection.

The results of the decrease in COVID-19 patients were explained by the dysfunction of the HPT axis in the pituitary gland, which leads to the disappearance of TSH secretion from the thyroid gland and thus leads to a decrease in the concentration of T3, T4 hormones due to the deterioration of thyroid activity in those infected with the virus.

Thyroid hormones are greatly affected by many pathological variables such as infections, viral infections, momentary tumors, kidney diseases, etc. This pathological condition is what causes an imbalance in thyroid hormones, so it is called the term (Non-Thyroidal illnedd synderom) and symbolizes it (NTI) and in case of infection With CORONAVIRUS, the reason for the low concentration of TSH, T3, T4 hormones is the serious damage to the THYROID GLAND cells, which are of two types: Follicular Epithelial Cells. and Parafollicular Epithelial Cells. (Wei, et.al 2007)

The results of our current study agree with the study of Chen et al. 2021, as it was observed that the levels of T3, T3, TSH hormones decreased in the blood serum of those infected with the emerging corona virus. may lead to death.

The main reason for the low concentration of TSH is the decrease in the activity of TSH-stimulating cells in the pituitary gland, and this leads to the activation of the thyroid gland and thus reducing the production of T4, T3 hormones in people infected with the emerging corona virus (Wei, et. al 2010).

CONCLUSION

1- Corona virus infection leads to many physiological disorders, and hormones are one of these disorders by affecting the endocrine system.
2- Corona virus infection leads to a decrease in the concentration of testicular lipid hormone in males.
3- T3,TSH hormone is affected when infected with Corona Virus.
4- The concentration of T4 hormone in the blood serum of people infected with the corona virus does not change.

REFERENCES

1. Agarwal , s and agarwal . k .(2020) endcrine changes in SARS-COVID2 patients and lessons from sars-cov. Postagrad. Medi.J.(96):412-416.
2. Al – Lami , R . Urban, r. volpi , E . and Baillargeon, j (2020) sex hormones and novel corona virus infectious disease (covid-19).mayo. clin . proc. 95 .(8) : 1714.
3. Al-taie , E.M. and Al-Mamoori , H.S.(2021) Assessement and FVIII,D-dimer , S-ferritin , and Lactate dehydrogenase in hospitalized Patin=ents with 2019 Coronavirus disease . Iraqi journal al Hematology . 10(2) . 125-157.
4. Bell ,A.Gagnon, A. Sori Sky,A(2003) TSH Stimulates IL-6 Secretion from Adipocytes in Culture , Arterioscter .Thromk vase Biol.23:65-70.
5. Besllastella, G.Maiorino ,M.and Esposito ,K.(2020) Endocrine Complications of Covid-19:what happens to thyroid and adrinel glands J.Endocrind.Invistig43:1169-1170.
6. Chen , i. and chen , H and yu , T (2020) clinical characteristics el 113 dereased patients with coronavirus 2019 . retrospective study BMJ .368:49-55.
7. Chen , m . Zhou , w. and X u,w.(2021) thyroid function analysis in 50 patients with covid-19 :a restrospective study thyroid . 31(1) :8-11.
8. Chen,I.Wu,D.Xu;C.(2020) Clinical characteristics of 113 decreased patients with coronavirus disease 2019:retrospectistudy .BMJ. 368:1091-1099.
9. Clark , s. abbara , A. and Dhillo , w.(2022) impact of covid-19 on endocrine system : a mini-review . endocrinology.163(1):1-20.
10. Dhindsa,S. Zhang,N.McPhaul,M,(2021) Association of Circulating sex hormones with information and disease severity in patient with Covid-19 JAMA Network open .4(5):e2111398.

11. Fliers,F.Bianco,A.Boelen,A[2015]Thyroid function, Lancet Diabetes Endoerinol.3:816-825.
12. Karlberg,J.Chong,D.Lai,W.Do men have a higher case fatality rate on server acute respiratory syndrome that women Am.Epidemiol.159(3):229-231 .
13. Lisco,G Yullio, A. Stragapede, A. and Triggiani , V .(2021) COVID-19 and the Endocrine system : A comprehensive Review on the theme . journal al clinical medicine . 10 (2920) :1-29.
14. Livingston , M . Rmachandran , s . and Hackett , g .(2022) low testosterone on hospital admission with covid-19 infection is associated with increased mortality. Androgens . clinical research and therapeutics . 3(1):14-21.
15. Mahmood – z.s.Fadhil , H.Y and Adhiah , A.H(2021) Estimation al hermatological Parameters al disease serveritt in Iraqi patients with COVID-19 iraqi Journal al Science .62.(10).pp.3487-3496.
16. Muehlenbein , mp . hirschtick , JL. Bonner, JZ . and Swartz , am . (2010) toward quantifying the usage costs el human immunity : altered methabolic rates and hormone levels during acute immune activation in men . am .j.hum.Biol. 22(4) 546-556.
17. Naz , M . Banaej , m . Dashti, s . and ramezani , F .(2021) an Overview al sex hormones in relation to SARS-COV2 infection . future virology . 16.(8) : 555-564.
18. Okcelic . s . (2021) covid-19 pneumonia causes lower testosterone levels . Andrologia . 53 (1) :13909.
19. Purdie,A.Hawkes,S.Buse,K. and Low,.(2020) sex Gander and Covid-19: Disaggregated Data and health Disparities. BMJ. Golb.Health Blog.41(32):3095-3099.
20. Rehman , s ravinayagam, v. nahvi, I and Al – Suhaimi , E . (2021) . immunity , sex hormones . and Emiromental factors as determinates at covid-19 disparity in women frintiers in immunology . (12) :1-12.
21. Van,G[2014]Non thyroidal illness in the ICU :A syndrome with different faetors.Thyoid.24: 1456-1465.
22. Wang , w, yx.y and Yao , h .(2003) , evaluation and observation al serum thyroid hormone and parathyroid hormone in patients with sever acute respiratory syndrome . J. Chin . antituberclosis.(25)232-234.
23. Wei , l . sun ,s . and ma . Q . (2010) Endocrine Cells of Adnohypophysis in sever acute respiratory syndrome (sars) . Biochem cell Biol . 88:723-730.
24. Wei , L . Sun,s Gu , J (2007) pathology of the thyroid in sever acute respiratory syndrome. HUM . pathal , 38 :95-102.
25. WEI,I.SUN ,S.XU,CH.GU.J. 2007 Pathology of the thyroid in sever acute respiratory syndrome Hum.Path.38[1]:95-102.