

M. D. Kamel

Biotechnology, Applied Science
Department,
University of Technology,
Baghdad, Iraq
Maryamdahary1992@yahoo.com

A. A. Mohammed

Biotechnology, Applied Science
Department,
University of Technology,
Baghdad, Iraq

A. A. Ibrahim

College of Business Economics,
Al-Nahrain University,
Baghdad, Iraq.

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C-reactive protein as a marker for cancer and poisoning thyroid gland

Abstract-This study was aimed to investigate the possibility of using C-reactive protein (CRP) as a marker for 11 types of cancer include (Ovarian, Bone, Pancreas, Liver, Lung, Cervical, Head, Kidney, Breast, Stomach and Prostate cancer) and poisoning thyroid gland disease by qualitative test for CRP. 50 serum samples from health human and about 150 serum samples were examined from patients with cancer and poisoning thyroid gland disease (aged between 14 and 85 years old). Qualitative test was done to detect the presence of CRP in the patient's serum. The qualitative test showed that all normal samples 50 (100%) give negative result for the presence of CRP in the serum. While 116 (89.9%) patients give negative result and 13 (10.1%) patients with cancer diseases give positive result to presence of CRP in the serum. And also 21 (100%) patients with poisoning thyroid gland disease give positive result to CRP. According to the results of this study C-reactive protein consider non-specific marker for all types of cancer diseases but can be used as marker for bone cancer. On the other hand CRP which demonstrated that, it a useful marker for patients with poisoning thyroid gland.

Keywords: CRP, qualitative test, Poisoning thyroid gland

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1. Introduction

Proteins are large biomolecular, or macromolecules, consisting of one or more long chains of amino acids residues. It considers essential parts of organisms and participates in virtually every process within cells. Proteins perform a vast array of functions within organisms, including catalyzing metabolic reactions, DNA replication, responding to stimuli, and transporting molecules from one location to another. Many proteins are enzymes that catalyze biochemical reactions and are vital to metabolism. Other proteins are important in cell signaling, immune responses, cell adhesion, and the cell cycle [1]. Proteins differ from one another primarily in their sequence of amino acids, which is dictated by the nucleotide sequence of their genes, and which usually results in protein folding into a specific three-dimensional structure that determines its activity. The linear chain of amino acid residues is called a polypeptide [2]. One of the most important proteins in the medical field and in identifying disease states associated with inflammation was C-reactive protein. C-reactive protein (CRP), is the one of the most important protein, belonging to pentraxin family of proteins [3]. This protein produced in many sites within the human body. It is produced by the liver in response to IL-6. It is also produced in very low concentration by non-hepatic cells [4]. The cytogenetic location for C-reactive protein gene: 1q23.2 which is the long (q) arm of human chromosome 1 at position 23.2 this position contain gene which encode to CRP this gene called CRP gene [5]. C-reactive protein was known to be involved in conjugation of pathogens to induce their destruction by complement system and is also studied as a marker of inflammation, disease activity and a diagnostic adjunct. It is act as marker for different diseases

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2412-0758/University of Technology-Iraq, Baghdad, Iraq

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include (Chronic obstructive pulmonary disease (COPD), cancer, chronic kidney disease (CKD), metabolic syndrome and also act as marker in the Prediction of coronary heart disease [6].

2. Materials and methods

I. Blood samples collection

Whole blood (2ml) was obtained under aseptic conditions from each subject by a vein puncture using a disposable syringe. All cases table (1) were diagnosed by the specialist doctor.

The sera were obtained by putting the blood samples in a clean dry gel tubes separately. The tubes centrifuged at 3000 rpm for 10 min. for qualitative test.

Table (1): The cases and the number of the persons that blood sample taken from them.

No.	Case	Number of persons
1	Healthy(control)	50
2	Poising thyroid gland	21
3	Ovarian cancer	8
4	Bone cancer	5
5	Pancreas cancer	7
6	Liver cancer	9
7	Lung cancer	10
8	Cervical cancer	8
9	Head cancer	14
10	Kidney cancer	10
11	Breast cancer	30
12	Stomach cancer	8
13	Prostate cancer	20

II. Qualitative test for C-reactive protein (Screening)

The method was used for detection the presence of CRP in the human serum for patients and control of healthy person by using protocol in the Latex kit for C-Reactive protein (Cat. No.: NS 514001). The CRP qualitative in human serum according to the following: Shake the CRP latex reagent gently and add 100 μ l of it to the circle on the glass slide and then add 100 μ l from the patient serum. They were mixed well by using disposable stirrer spreading the mixture over the whole test area and title the slide gently. After that they were agitated about 2 min by hand and observe for the presence or absence of agglutination. If an agglutination of the latex particles suspension will occur within 2 min this meaning positive result and if no agglutination will occur this meaning negative result.

3. Results and discussion

Serum specimens were tested for presence of CRP using latex kit for CRP figure (1) shown the presence or absence of agglutination.

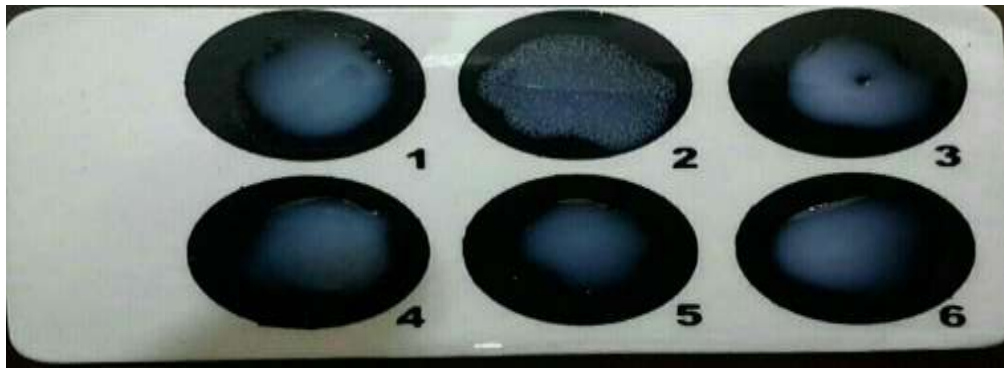
The results of qualitative test are shown in the figure (2). These included (50) health persons and (150) patients divided to twelve groups: first group consist of 20 patients with prostate cancer. Second group consist from 8 patients with stomach cancer. Third group consist from 30 patients with breast cancer. Fourth group consist from 10 patients with kidney cancer. Fifth group consist from 14 patients with head cancer. Sixth group consist from 8 patients with cervical cancer. Seventh group consist from 10 patients with lung cancer. Eighth group consist from 9 patients with liver cancer. Ninth group consist from 7 patients with pancreas cancer. Tenth group consist from 5 patients with bone cancer. Eleventh group consist from 8 patients with ovarian cancer and the last group consist from 21 patients with poisoning thyroid gland. However, the results obtained from qualitative test for control group 50 (100%) samples give negative result to CRP.

While the results obtained from qualitative test for patient group was that the first group 20 (100%) patients with prostate cancer give negative result to CRP while the study of [7], demonstrated that the CRP produce with high level in the serum of patient with prostate cancer. 2 (25%) patients give positive result and 6 (75%) patients with stomach cancer give negative result to CRP this result agree with study [8], proved that not all patients produced CRP or give positive result to the examinations that detection produce CRP in serum patients. 1 (3.3%) patient give positive result and 29 (96.7%) patients with breast cancer

give negative result to CRP while the study of [9], Which proved that the CRP was act as marker for predictor and to identify the risk of breast cancer. 2 (20%) patients give positive result and 8 (80%) patients with kidney cancer give positive result to CRP while the study of [10], demonstrated that C-reactive protein (CRP) is considered a useful serum marker for patients with kidney cancer. 2 (14.3%) patients give positive result and 12 (85.7%) patients with head cancer give negative result to CRP this result agree with study [11], that proved CRP non-specific marker for head and neck cancer when only about (30.6%) patients produced CRP in serum. 8 (100%) patients with cervical cancer give negative result to CRP while the studies of [12,13] that demonstrated CRP produce with high level in patients with cervical cancer and considered CRP useful serum marker for this patients. 6 (80%) patients give negative result and 2 (20%) patients with lung cancer give positive result to CRP while the study of [14], that proposed the levels of CRP in serum sample are increased in patients with lung cancer. 9 (100%) patients with liver cancer give negative result to CRP while the study of [15], that demonstrated the level of CRP increase in patients with liver cancer. 7 (100%) patients with pancreas cancer give negative result to CRP this result agree with study of [16], that demonstrated the higher CRP concentrations are not associated with pancreatic cancer.

1 (20%) patient give negative result and 4 (80%) patients with bone cancer give positive result to CRP this result agree with study of [17], which demonstrated that the level of CRP in serum are increased and its considered a useful marker in patients with bone cancer. 8 (100%) patients with ovarian cancer give negative result to CRP this result agree with study of [18], which demonstrated that CRP was not related to risk of ovarian cancer. 21 (100%) patients with poisoning thyroid gland give positive result to CRP this result agree with study of [19], which significantly that higher rise in serum CRP level in patients with thyroid disease. The inflammation consider common causes of thyroid disease this make the CRP one of the most important marker of this disease [19], because in the case of response to inflammation the macrophage and neutrophil cells secretion the group of cytokines in the blood, the most notably interleukins IL-1, IL-6 and IL-8. This make the liver responds and works to produce large amounts of CRP. While the level of CRP in the blood of the patients with cancer disease was decrease after the chemical and radiation therapy [20], this make the presence of CRP uncommon in all patients with cancer disease after

therapy
for this
reason
this
protein
doesn't
act as
good
marker
for
cancer
in
therapy stage .



Figure(1): Shown the presence or absence of agglutination in serum samples by using latex kit for CRP, the circles from 1 to 3 show the result of presence or absence of agglutination in serum samples for patients and only circle 2 gave positive result (presence of agglutination), while 1 and 3 circles gave negative result (absence of agglutination). The circles from 4 to 6 gave negative result or show the absence of agglutination in serum samples for healthy persons.

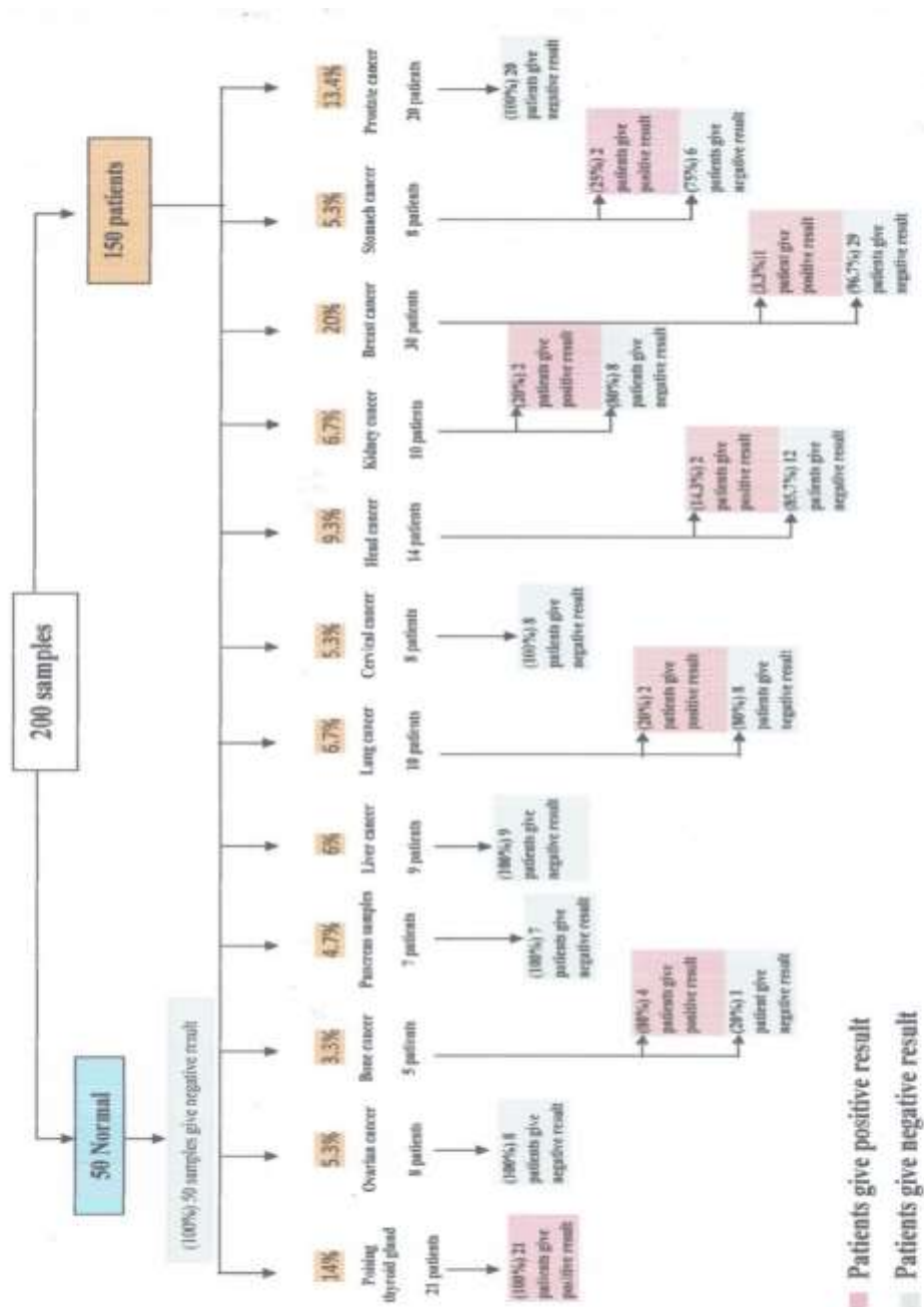


Figure (2): Percentages of the positive and negative samples to CRP in the patients with cancer, poisoning thyroid gland disease and the control group by qualitative test.

4. Conclusion

C-reactive protein consider non-specific marker for all types of cancer diseases depending on our samples but can be used as marker for bone cancer. On the other hand CRP which demonstrated that, it a useful marker for patients with poisoning thyroid gland and it can be act as marker for predictor and to identify the risk of this disease.

Reference

- [1] A.A. Al-janabi, "Cell Biology," Univ. Technology press. Baghdad. Iraq. PP. 59-58, 2009. (In Arabic)
- [2] A.A. Al-janabi, "Molecular Biology," Adnan publishing and press com. Baghdad Iraq. PP. 186-187, 2013. (In Arabic)
- [3] S. Chandrashekar, "C - reactive protein: An inflammatory marker with specific role in physiology, pathology, and diagnosis," Internet Journal of Rheumatology and Clinical Immunology. Vol. 2, No. 1, PP. 1-23, October, 2014.
- [4] Y. Torre, M. Fabbri, S. Jaillon, A. Bastone, M. Nebuloni, A. Vecchi, A. Mantovani, and C. Garlanda, "Evolution of the Pentraxin Family: The New Entry PTX4," Journal of Immunology, "Vol. 184, No. 9, PP. 5055-5064, March, 2010
- [5] B.P. Mark, and M.H. Gideon, "C-reactive protein: a critical update," Journal of Clinical Investigation. Vol. 111, No. 12, PP. 1805-1812, June, 2003.
- [6] K. Pai, S. Shu-Chu, and W. Ta-Jen, "Serum C-Reactive Protein as a Marker for Wellness Assessment," Annals of Clinical & Laboratory science. Vol. 36, No. 2, PP. 163-169, March, 2006.
- [7] K. Youngjun, Y. Jeon, H. Lee, D. Lee, and B. Shim, "The Prostate Cancer Patient Had Higher C-Reactive Protein Than BPH Patient," Korean Journal of Urology. Vol. 54, No. 2, PP. 85-88, February, 2013.
- [8] M. Joanna, K. Zbigniew, P. Beata, O. Joanna, and K. Halina, "Platelets and Inflammatory Markers in Patients with Gastric Cancer," Journal of Immunology research. Vol. 2013, No. 145647, PP. 1-6, February, 2013.
- [9] B.A. Shilpa, N.A. Balaji, V.T. Unmesh, A. Suresh, and P.T. Anand, "C-Reactive Protein and Breast Cancer: New Insights from Old Molecule," International Journal of Breast Cancer. Vol. 2015, No. 145647, PP. 1-7, November, 2015.
- [10] H. Ito, K. Shioi, T. Murakami, A. Takizawa, F. Sano, T. Kawahara, N. Mizuno, K. Makiyama, N. Nakaigawa, T. Kishida, T. Miura, Y. Kubota, and M. Yao, "C-reactive protein in patients with advanced metastatic renal cell carcinoma: Usefulness in identifying patients most likely to benefit from initial nephrectomy. Biomed center," Vol. 12, No. 337, PP. 1-8, August, 2012.
- [11] A. Kruse, T. Leubbers, and W. Gratz, "C-reactive protein levels: a prognostic marker for patients with head and neck cancer," BioMed Central, Vol. 2, No. 21, PP. 1-4, August, 2010.
- [12] P. Stephan, G. Christoph, T. Clemens, S. Gerhard, S. Paul, R. Alexander, and H. Lukas, "C-reactive protein is a prognostic parameter in patients with cervical cancer," Elsevier Journal, Vol. 107, No. 1, PP. 114-117, October, 2007.
- [13] S. Polterauer, C. Grimm, R. Zeillinger, G. Heinze, C. Tempfer, A. Reinthaller, and L. Hefler, "Association of C-Reactive Protein (CRP) Gene Polymorphisms, Serum CRP Levels and Cervical Cancer Prognosis," AntiCancer Research, Vol. 31, No. 6, PP. 2259-2264, 2011.
- [14] A. Hassan, and R. Sherif, "CRP evaluation in non-small cell lung cancer," Egyptian Journal of Chest Diseases and Tuberculosis. Vol. 63, No. 3, PP. 717-722, July, 2014.
- [15] W. Chen, B. Wang, C. Abent, M. Dawsey, H. Fan, Y. Yin, J. Yin, R. Taylor, L. Qiao, and D. Freedman, "Association between C-reactive protein, incident liver cancer and chronic liver disease mortality in the Linxian Nutrition Intervention Trials: a nested case-control study," Cancer Epidemiology Biomarkers Prevention, Vol. 24, No. 2, PP. 386-392, January, 2015.
- [16] B. Douglas, T. Sliverman, J. Weinstein, I. Graubard, N. P. Ollak, X. Tao, V. Jarmo, D. Albanes, and Z. Solomon, "Serum C-Reactive Protein and Risk of Pancreatic Cancer in Two Nested, Case-Control Studies," Cancer Epidemiology Biomarkers Prevention, Vol. 20, No. 2, PP. 359-369, December, 2010.
- [17] J. Yi, D. Wang, Y. Li, J. Hu, F. Niu, and L. Liu, "C-Reactive Protein as a Prognostic Factor for Human Osteosarcoma: A Meta-Analysis and Literature Review," Plos one. Vol. 9, No. 5, PP. 1-7, May, 2014.
- [18] E. Iundin, L. Dossus, T. Clendenen, V. Krogh, K. Grankvist, M. Wulff, S. Sieri, A. Arslan, P. Lenner, F. Berrino, G. Hallmans, Z. Jaceutte, P. Toniolo, and A. Lukanova, "C-reactive protein and ovarian cancer: a prospective study nested in three cohorts (Sweden, USA, Italy)," National Institution Healthy. Vol. 20, No. 7, PP. 1151-1159, September, 2009.
- [19] B.P. Manash, and B. Bhaskar, "Significant role of serum CRP in differentiating inflammatory from non-inflammatory causes of thyrotoxicosis," Indian Journal of endocrinology and metabolism, Vol. 16, No. 6, PP. 976-981, May, 2012.
- [20] W. A. Hall, M. C. Nickleach, M. Master, R. S. Prabhu, P. J. Rossi, K. Godette, S. Cooper, and A. B. Jani, "The Association Between C-Reactive Protein (CRP) Level and Biochemical Failure-Free Survival in Patients After Radiation Therapy for Nonmetastatic Adenocarcinoma of the Prostate," Cancer. Vol. 119, No. 18, PP. 3262-3264, July, 2013.

Author biography



Maryam Dhary Kamel was born in Baghdad, Iraq in March 1992. She received her B.Sc degrees in 2014 from University of Technology. Her research interest are Bioinformatics, Protein structure prediction, Computational genomics, Molecular Biology Science, Gene Science, and Mutations on the gene and protein level. Maryam is currently master student in Biotechnology, Applied Science Department, University of technology, Baghdad, Iraq

