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A study of the physiological disorders of slimming drugs on people who abuse them

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ABSTRACT: Recently, slimming drugs have been used to get rid of excess weight and obesity, which consist of chemical compounds of different compositions that vary in the degree of their safety on health from one compound to another and have dangerous side effects on human life. 75 blood samples were collected from people who take weight-loss drugs after being asked about their use of these drugs, and 25 samples from people who did not take weight-loss drugs, a control group. The research samples were divided into categories of withdrawal, the duration of abuse is less than a year, (1-2) years, (2-4) years and (4-6) years. Laboratory tests were conducted on them from W.B.C count white blood cell, W.B.C differential, Packed Cell Volume P.C.V., R.B.C. count red blood cell, serum. Total protein and hemoglobin Hb. The search results showed a significant decrease in W.B.C count ($P<0.05$) in the abused groups in the period (1-2) and it was 7000 mm^3 while the control sample was 82800 mm^3 either in the periods (2-4) and (4-6) years. It was low 6977.7 mm^3 compared to the control sample. It also showed a significant increase in the rate of basophil and eosinophil preparation ($P<0.05$) in all periods, while a significant decrease occurred in the rate of lymphocyte. It also found a significant decrease in R.B.C., serum total protein and PCV. As for Hb, there was a significant decrease ($P<0.05$) in drug users compared to control samples for all periods. We conclude that slimming drugs have harmful effects on those who take them and may cause greater harm in the future in addition to the possibility of their effect on other organs and systems in the body if other studies focus on that.

Keywords: Healthcare, overweight, obesity, blood tests, slimming drugs

1. INTRODUCTION

There are widespread cases of overweight and a relative form globally. It is estimated that more than 1 billion adults suffer from overweight and among all age groups [1, 2] that a healthy body actually needs a small percentage of the amount of fat in order to complete physiological functions and supply the body with the necessary energy, but fats are collected in large quantities Significant leads to obstruction of vital functions and activities associated with movement, which require flexibility as well as affect the external shape of the body [3]. Weight gain generally occurs when the amount of food consumed that contains huge amounts of energy is more than the body needs [4]. The lack of movement and taking some medications in addition to eating foods that contain a lot of fatty substances and high carbohydrates leads to the occurrence of obesity [5]. The harm of obesity or overweight leads to psychological and

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social harm for people who are overweight, recent studies indicate that one of the reasons for the emergence of malignant tumors is caused by obesity, in addition to the medical view of obesity as a disease in itself, some studies have shown that the death rate increases compared to people of normal weight [6].

The damage caused by obesity has led to an interest in the matter and an attempt to obtain treatment for obesity, so exercise has been used and some drugs and drugs have recently been developed to lose weight, either through loss of appetite, or by reducing the absorption of sugars, or through the gut [7]. There are medicines that affect the nervous system and lose the appetite for food and may affect the digestive enzymes of food, or medicines that make the person taking them to feel full [8]. Slimming drugs consist of chemical compounds and these compounds affect the nervous system by affecting the neurotransmitters, the chemical compounds included in the composition of slimming drugs differ in the strength of the degree of their safety impact on health from one compound to another [9].

Studies have found that most slimming drugs have side effects ranging in severity between addiction and acquisition when quitting, in addition to their effect on raising blood pressure or their effect on heart patients or hyperthyroidism [10]. Studies have shown that the effect of the substance in many slimming pills is that it causes a change in the proportions of female reproductive hormones, whether by increase or decrease. While another study showed the presence of dangerous effects in the liver, which leads to the occurrence of cracking and decay in the liver cells, and that its use for long periods leads to the occurrence of cirrhosis of the liver, and a study indicated that the compounds of slimming drugs have a toxic effect on the kidneys, which leads to an increase in creatine in the blood and thus may Death occurs, and in the study of signs that the exit of these compounds through the kidney leads to stress to the kidneys and in turn leads to a decrease in the efficiency of the kidney's work in performing its normal functions [11].

In view of the importance of the research and the lack of studies related to the tests and analysis used in this research, in addition to the limited previous studies on the kidney, liver, and blood pressure without addressing the effects of these drugs on the blood tissue and the importance of this tissue and its active cycle in the body of the organism [12-23].

The Aim of the study is: firstly, knowing the effect of slimming on the physiological variables of the blood tissue. Secondly, knowing the side effects caused by taking slimming drugs for long periods of time. Thirdly, health education for persons who use these medicines for the public's health and safety.

2. Materials and Methods

2.1 SAMPLE COLLECTION

75 blood samples were collected from people who take weight-loss drugs, after asking them about their use of these drugs. In addition, 25 samples were collected from people who did not take drugs or slimming pills as a control group. 5 ml of venous blood was drawn from the studied samples using a 5 ml medical syringe, then the blood was placed in a 10 ml glass tube, and in the same way, the samples of the control group were drawn (for comparison).

The analyzes of the research were conducted in private laboratories and laboratories of the Department of Life Sciences, depending on the scientific methods used globally.

2.2 The Total Number Of White Blood Cells Total Leucocytes Count

Use Turke's Fluid dilution solution to count the total white blood cell count. Where I put 0.4 ml of leave solution in a clean test tube (Chan tube), then add 0.02 ml of drawn blood to it, shake the mixture well and leave for 10 minutes, then transfer a drop of the mixture to the cell counter after placing the slide cover and leave for two minutes for the cells to settle. Then the cell counter was transferred to the microscope platform and examined under the low magnification power X10 and then the magnification power X40. The number of white blood cells was counted in the four large squares in the corners, according to the equation [24]

$$\text{W.B.C. Count} = \text{Number Cells Counted} \times 50 \quad \text{W.B.Cs/mm}^3$$

2.3 DIFFERENTIAL LEUCOCYTES COUNT

A blood smear was prepared by placing a drop of blood on the edge of a new glass slide, then passing the spreader over it diagonally to obtain a uniform smear on a new slide and left to dry in the laboratory atmosphere, after that the glass slide was stained using Leishman's Stain by placing a few drops of this dye until the smear covers the blood for (1-2) minutes, then drops of P.B.S. buffer solution are added to it. pH = 6.8, and it is almost twice the amount of dye to dilute the dye and leave for 10 minutes after which the slide is washed with distilled water gently, and left to dry diagonally using the oil lens. 200 white blood cells are counted from the slide and the different types of white blood cells are expressed in number and percentage. A blood smear was prepared by placing a drop of blood on the edge of a new glass slide, then passing the spreader over it diagonally to obtain a uniform smear on a new slide and left to dry in the laboratory atmosphere, after that the glass slide was stained using Leishman's Stain by placing a few drops of this dye until the smear covers the blood for (1-2) minutes, then drops of P.B.S. buffer solution are added to it. pH = 6.8, and it is almost twice the amount of dye to dilute the dye and leave for 10 minutes after which the slide is washed with distilled water gently, and left to dry diagonally using the oil lens. 200 white blood cells are counted from the slide and

the different types of white blood cells are expressed in number and percentage. The blood is allowed to flow into the capillary tube through the capillary property, leaving about 15 mm of the tube unfilled, then one end of it was closed with artificial clay, then placed in a micro-centrifuge and the machine was operated for 5 minutes at a speed of 6000 r.p.m rpm, then the tubes were extracted from the apparatus. Microcentrifugation was placed on a Haematocrit Reader and the percentage of P.C.V. agglutinated blood cells was read. % [25].

2.4 TOTAL RED BLOOD CELL COUNT TOTAL ERYTHROCYTES COUNT

Use the Hymes Fluid dilution solution to count the total red blood cell count. Where 2 ml of Heims solution was placed in a clean test tube (Chan tube), then 0.02 ml of blood drawn was added to it, the mixture was shaken well, then a drop of the mixture was transferred to the cell counter after placing the slide cover and left for two minutes for the cells to settle, then the cell counter was transferred To the platform of the microscope, it was examined under the small magnification power x10 and then the magnification power x40. The number of red blood cells was counted in five small squares in the large central square. According to the equation [26]

$$\text{R.B.C. Count=Number Cells Counted X 10000 R.B.C}_s/\text{mm}^3$$

2.5 ESTIMATING THE AMOUNT OF TOTAL PROTEIN IN THE SERUM

I used ready-made analyzes from the company Vishal Diagnostics in measuring the amount of total protein in the blood serum of people who take slimming drugs.

2.6 MEASURE THE VALUE OF HEMOGLOBIN IN THE BLOOD, HB HEMOGLOBIN ESTIMATION

Cyanomethemoglobin method was used to estimate the concentration of hemoglobin in a blood sample. This method includes the use of Drabkin's solution. The intensity of the formed color is proportional to the amount of iron present in the hemoglobin. The color intensity is measured using a spectrophotometer at wavelength (450) nanometers. The process of calculating the percentage of hemoglobin is done by putting 5 ml of Drapkin's solution in a clean test tube, then adding 0.02 of blood to it. A standard tube is brought with each test meal, in which 0.02 ml of standard hemoglobin of known concentration is added instead of blood. The two tubes are shaken well and then left for 10 minutes. Then the optical density was read, and the hemoglobin concentration was determined using its equation [27-28]

$$\text{Hemoglobin (g/dl)} = (\text{Test} / \text{Std}) \times \text{Hb.std.}$$

2.7 STATISTICAL ANALYSIS

Statistical analysis was conducted for all the studied samples using the SPSS statistical program, where the ANOVA test was conducted to determine the significant differences between the studied treatments, and the Tukey test for individual comparisons between the means of each treatment and another, and the differences were considered statistically significant and significant if it was ($P<0.05$). Microsoft Excel for drawing charts.

3. RESULTS AND DISCUSSION

Sample distribution Samples were distributed according to two criteria: sex, duration of use Distribution of samples based on duration of administration The samples were distributed according to the duration of use, and this included all samples compared to the control group (non-users) and the table included white blood cells of all kinds And red blood cells R.B.C. and Hb hemoglobin and P.C.V and protein and the categories were The duration of use was withdrawn from (1-2 years), (2-4 years), (6-4 years) and less than a year, as shown in Table 1.

TABLE 1. - Control group and users of slimming pills depending on the duration of the pills abuse

Protein (g/dl)	RBC (million/mm^3)	Basophil (mm^3)	Monocyte (mm^3)	Eosinophil (mm^3)	Lymphocyte (mm^3)	Neutrophil (mm^3)	WBC (mm^3)	Hb (gm/dl)	P.C.V.
Collection the control 25 users 75									
7.8	6.1	60	391	100	2101	5171	8301	14	45.80
Lower than 1 years old, users 25									
5.7	4.2	105	95	281	1001	8001	4010	10	39.2
(1-2) years old, users 25									
5.5	4.5	110	94	289	1150	8000	4111	11	42.1
(2-4) years old, users 25									
5	4	120	101	275	1010	8111	4115	11	41.1
(4-6) years old, users 25									
6.4.1	4.1	120	102	281	1003	8109	4110	10	39.2

The distribution of samples on the basis of sex, and the samples were distributed according to gender compared to the control group. The table included males and females, types of white blood cells, red blood cells, Hb and P.C.V., as shown in Table 2.

TABLE 2. - The effect of weight loss pills on magnets, based on a total of 100, on sex, compared to the control group

Protein (g/dl)	RBC (million/mm^3)	Basophil (mm^3)	Monocyte (mm^3)	Eosinophil (mm^3)	Lymphocyte (mm^3)	Neutrophil (mm^3)	WBC (mm^3)	Hb (gm/dl)	P.C.V.
Collection the control 25 users 75									
7.8	6.1	60	391	100	2101	5171	8301	14	45.80
Male abusers 35									
5.1	4.6	121	102	281	1013	9001	4121	11	41.5
Female abusers 40									
4.9	4.1	105	99	278	1145	8113	4222	10	40.5

Physiological blood parameters, the effect of slimming pills on drug users, depending on the duration of use of white blood cells (W. B. C.), the results, as shown in Table 1, indicate a decrease in blood cells The white blood cells were significantly ($P < 0.05$) in the abused groups in the period (1-2), where it became 4111 mm³ in the abusers, while in the control individuals (8301 mm³) and in the two periods (4-2) and (6-4) the white blood cells were low It reaches (4115, 4110) mm³ compared to the control individuals. As for the members of the group consuming for less than a year, the results indicate an increase in white blood cells.

Differential white blood cell count, the study found, by observing Table 1, an increase in the rate of preparation of neutrophil white blood cells, and significantly ($P < 0.05$) in all time periods, while there was a decrease in the rate of leukocytes, as we note as shown In Table 1, the group consuming for a period of (1-2) years did not record significant differences in the rate of white blood cells.

In groups (2-4) and (4-6) years and less than a year, the rate of acidity in white blood cells increased. Basophil node monocyte leukocyte preparation rate did not register a significant difference ($P < 0.05$).

Red blood cells, the results indicate, as shown in Table 1, a slight change in the number of red blood cells for those taking slimming pills, compared to the control group whose red blood cell count was 6.1 million/mm³, while in individuals taking the pills for less than a year, it decreased to 4.2 million/ mm³ and also decreased for users in the time periods between (6-2) years.

Hb hemoglobin, hemoglobin (P. C. V.) and protein, the results of the study showed that the percentage of hemoglobin Hb in the blood of the control individuals is 14 gm/dl, and significant differences were found that did not rise to the level of significance ($P<0.05$), which is a slight decrease in Hb.

The results are shown in Table 1 indicated a decrease in (P. C. V.) cells of drug users compared to control individuals and a decrease in blood protein as well.

The effect of weight loss pills on drug users, depending on gender (W. B. C.) white blood cells, the results, as shown in Table 2, indicate a significant ($P<0.05$) decrease in the rate of white blood cell count in males taking slimming pills compared to control (measurement) individuals, where the average white blood cell count for control individuals was 8301 mm³ in males who took weight-loss pills, it was 4121mm³.

As the results indicated in Table 2, there was a significant ($P<0.05$) decrease in the female taking the pills for slimming, as the decrease in the white blood cell rate was 4222 mm³ compared to the control individuals (measurement).

Differential white blood cell count

The results indicate, as shown in Table 2, that the rate of neutrophil white blood cell counts increased significantly ($p < 0.05$), reaching 8113 per mm³ in females and 9001 per mm³ in males compared to control individuals, which is 5171 per mm³.

Whereas, the rate of lymphocyte counts in males and females decreased significantly ($p < 0.05$) as it reached in males 1013 per mm³ and in females 1145 per mm³ compared to the control subjects who had lymphocytes 2101 per mm³.

As the results showed in Table 2, the rate of eosinophilic leukocytes did not constitute significant differences compared to the control individuals for males and females, as well as the rate of leukocytes in the Basophil node.

As for the monocyte rate, it decreased in the Females, as shown in Table 2, and there was no difference in males

Red blood cells (R. B. C.)

The results indicate, as shown in Table 2, the occurrence of a slight change in the rate of red blood cell count in males and females, which reached 4.6 million/mm³ in males taking slimming pills and in females taking 4.1 million/mm³ weight loss pills, compared to controls 6.1 million/mm³.

Hemoglobin

Hemoglobin, P.C.V, and protein, the results listed in Table 2 are clarified Significantly ($p<0.05$) decrease in Hb among drug abusers, but in abused females, Hb decreased slightly compared to control individuals. As for P.C.V. and proton in the blood, it decreased in drug abusers compared with control subjects.

4. CONCLUSION

Physiological Blood Parameters (P. B. P.)

The human blood system is very sensitive to some environmental signals due to the rapid formation and destruction of cells in addition to the blood being one of the most important and first affected tissues With (1) external and internal influences, it is also one of the tissues that are easy to obtain And the possibility of measuring the effect of some chemical pollutants on its cellular components, in addition to Being an indicator of the different physiological states that the body is going through because it has components Fixed. Any deviation in the body's physiological activities is reflected in the properties of the blood and its components on this basis, interest in blood has increased in various fields, especially in the medical fields and physiological (11)

White Blood Cells (W. B. C.)

The current study found a significant decrease ($P<0.05$) in the average total number of corpuscles White blood in male and female drug users and in all sample periods. The study was compared with the control group. This study agreed with the findings of the studies many (11), (13) and (17) these studies have mentioned that the reason for this is the presence of chemicals present in Slimming pills that lead to a decrease in the total number of white blood cells and thus The immunity of those taking slimming pills decreases, as a disturbance in the production of blood cells occurs Eggs can be a reflection of a secondary response to certain toxins and chemicals (12) so (2) A decrease in the total number of white blood cells (W.B.C) as a result of taking pills Slimming reflects an immune response to some diseases

Differential White Blood Cell Count (D. W. B. C. C.)

By observing the results in Tables 1 and 2, the study found a high Significantly ($P>0.05$) in the mean neutrophil N neutrophil count in all Sample categories and over all time periods of the users that the increase in the rate of pellet counts White blood neutrophils due to the abuse of slimming pills that affect these manufacturing areas Pellets such as (bone marrow) (5) and thus lead to increased production of white blood cells Justice because it is the body's first defense against any foreign body, whether it is a chemical substance It is present in slimming pills or whatever, so its numbers are increased as much as possible With regard to lymphocytes, the study also showed that there are differences Significantly ($P < 0.05$) in the number of white blood cells, as their numbers decreased in all Ocular classes and that lymphocytes are responsible for the formation of antibodies and thus Affect the body's immunity, and a study (6) stated that there is an inverse relationship between neutrophilic leukocytes and lymphocytes, as the increase in neutrophilic leukocytes Leads to a decrease in lymphocytes, where the processes of phagocytosis increase either As for the Eosinophil leukocyte leukocyte count, there were no significant differences with the control group for males and females, but depending on the duration of use, the longer the duration of use Eosinophil eosinophilic leukocytes increased The results show that Basophil leukocytes did not register a significant difference ($p < 0.05$).

In all groups and for the duration of use, as for the single white blood cells, it decreased in females than in males compared to the control group. (R. B. C.) red blood cells The results, as shown in Tables 1 and 2, indicate that the rate of red blood cell counts, the longer the duration of use, the less their numbers, as a study indicates that any injury or damage, as happens in the case of exposure to radiation or some chemicals, leads to a decrease in Prepared by (2) Hb Hemoglobin, (P.C.V.) and protein The results of the study showed an unnoticeable change in Hb in the samples, but a study showed that at the beginning of taking the drug and the longer the substance used (4), the value of Hb, (P.C.V.) and protein in the blood drops for those taking slimming pills.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest

REFERENCES

[1] W. Xu, H. Zhang, S. Paillard-Borg, H. Zhu, X. Qi, and D. Rizzuto, "Prevalence of Overweight and Obesity among Chinese Adults: Role of Adiposity Indicators and Age," Obesity Facts, vol. 9, no. 1, pp. 17–28, 2016, doi: 10.1159/000443003.

[2] G. Nilsson, "A LEGITIMATE OR AN ILLEGITIMATE PROBLEM? How School Nurses Establish a Logic of Distinctions among Children who are Overweight or Suffer from Obesity," 2015, vol. 45, no. 1, Jan. 2015, doi: 10.16995/ee.1136.

[3] S. RV Subramaniam, "Small for Size Syndrome: How Small is Actually Too Small?," International Journal of Transplantation & Plastic Surgery, vol. 2, no. 3, 2018, doi: 10.23880/ijtps-16000126.

[4] T. KINAY, R. ÖZELÇİ, B. DİLBAZ, İ. KAHYAOĞLU, and Ö. MORALOĞLU TEKİN, "Relationship between gestational weight gain and amount of postpartum bleeding," Journal of Contemporary Medicine, vol. 10, no. Erken Görünüm, pp. 1–5, May 2020, doi: 10.16899/jcm.636511.

[5] K. M. Davison, "The relationships among psychiatric medications, eating behaviors, and weight," Eating Behaviors, vol. 14, no. 2, pp. 187–191, Apr. 2013, doi: 10.1016/j.eatbeh.2013.01.001.

[6] P.-A. JM, "Self-Experiencing 'The Healthiest Weight,'" Journal of Obesity and Overweight, vol. 3, no. 1, May 2017, doi: 10.15744/2455-7633.3.101.

[7] A. G Al-Kushi, N. A. El Sawy, and H. M M, "Therapeutic Effect of Vitamin E on Testicular Tissue Damage Caused by Obesity," Journal of Obesity & Weight Loss Therapy, vol. 06, no. 05, 2016, doi: 10.4172/2165-7904.1000320.

[8] K. Lundstrom, H. Pham, and L. Dinh, "Interaction of Plant Extracts with Central Nervous System Receptors," Medicines, vol. 4, no. 1, p. 12, Feb. 2017, doi: 10.3390/medicines4010012.

[9] M. O. Anwar, N. Bodagh, M. H. Iqbal, and A. Timmis, "Vasospastic myocardial infarction caused by a slimming agent—do not forget non-prescription drugs," Oxford Medical Case Reports, vol. 2017, no. 4, Apr. 2017, doi: 10.1093/omcr/omx008.

[10] "Serious adverse reactions have been reported with ephedrine-containing slimming drugs, Therma Power and Grenade Fat Burner.," Reactions Weekly, vol. &NA;, no. 1190, p. 5, Feb. 2008, doi: 10.2165/00128415-200811900-00015.

[11] "Dieters buy slimming pills online to avoid pharmacists and GPs," The Pharmaceutical Journal, 2017, doi: 10.1211/pj.2017.20204065.

[12] B. Pan, X. Wan, M. Ma, and C. Cao, "Complement C3 and Nonalcoholic Fatty Liver Disease in Chronic Kidney Disease Patients: A Pilot Study," Kidney and Blood Pressure Research, pp. 1–9, Jan. 2020, doi: 10.1159/000504172.

[13] M. Rasheed, O. Alabdali, S. Shihab, A. Rashid, and T. Rashid, "On the Solution of Nonlinear Equation for Photovoltaic Cell Using New Iterative Algorithms," Journal of Physics: Conference Series, vol. 1999, no. 1, p. 012078, Sep. 2021, doi: 10.1088/1742-6596/1999/1/012078.

[14] A. H. Ali, A. S. Jaber, M. T. Yaseen, M. Rasheed, O. Bazighifan, and T. A. Nofal, "A Comparison of Finite Difference and Finite Volume Methods with Numerical Simulations: Burgers Equation Model," Complexity, vol. 2022, pp. 1–9, Jun. 2022, doi: 10.1155/2022/9367638.

[15] M. Darraji, L. Saqban, T. Mutar, M. Rasheed, and A. Hussein, "Association of Candidate Genes Polymorphisms in Iraqi Patients with Chronic Kidney Disease," Journal of Advanced Biotechnology and Experimental Therapeutics, vol. 6, no. 1, p. 687, 2022, doi: 10.5455/jabet.2022.d147.

[16] D. Bouras, M. Rasheed, R. Barille, and M. N. Aldaraji, "Efficiency of adding DD3+(Li/Mg) composite to plants and their fibers during the process of filtering solutions of toxic organic dyes," Optical Materials, vol. 131, p. 112725, Sep. 2022, doi: 10.1016/j.optmat.2022.112725.

[17] N. Assoudi et al., "Comparative examination of the physical parameters of the sol gel produced compounds La0.5Ag0.1Ca0.4MnO3 and La0.6Ca0.3Ag0.1MnO3," Optical and Quantum Electronics, vol. 54, no. 9, Jul. 2022, doi: 10.1007/s11082-022-03927-x.

[18] M. Al-Darraji, S. Jasim, O. Salah Aldeen, A. Ghasemian, and M. Rasheed, "The Effect of LL37 Antimicrobial Peptide on FOXE1 and lncRNA PTCSC 2 Genes Expression in Colorectal Cancer (CRC) and Normal Cells," Asian Pacific Journal of Cancer Prevention, vol. 23, no. 10, pp. 3437–3442, Oct. 2022, doi: 10.31557/apjcp.2022.23.10.3437.

[19] D. Bouras, M. Fellah, A. Mecif, R. Barillé, A. Obrosov, and M. Rasheed, "High photocatalytic capacity of porous ceramic-based powder doped with MgO," Journal of the Korean Ceramic Society, Oct. 2022, doi: 10.1007/s43207-022-00254-5.

[20] Bouras and M. Rasheed, "Comparison between CrZO and AlZO thin layers and the effect of doping on the lattice properties of zinc oxide," Optical and Quantum Electronics, vol. 54, no. 12, Oct. 2022, doi: 10.1007/s11082-022-04161-1.

[21] M. A. Sarhan, S. Shihab, B. E. Kashem, and M. Rasheed, "New Exact Operational Shifted Pell Matrices and Their Application in Astrophysics," Journal of Physics: Conference Series, vol. 1879, no. 2, p. 022122, May 2021, doi: 10.1088/1742-6596/1879/2/022122.

[22] M. Rasheed, M. Nuhad Al-Darraji, S. Shihab, A. Rashid, and T. Rashid, "The numerical Calculations of Single-Diode Solar Cell Modeling Parameters," Journal of Physics: Conference Series, vol. 1963, no. 1, p. 012058, Jul. 2021, doi: 10.1088/1742-6596/1963/1/012058.

[23] M. Rasheed, M. N. Al-Darraji, S. Shihab, A. Rashid, and T. Rashid, "Solar PV Modelling and Parameter Extraction Using Iterative Algorithms," Journal of Physics: Conference Series, vol. 1963, no. 1, p. 012059, Jul. 2021, doi: 10.1088/1742-6596/1963/1/012059.

[24] S. S. Laein, B. Hormozi, A. Neamati, G. Safaeian Layen, and M. Homayouni-Tabrizi, "Evaluating effects of electromagnetic fields on the total number and percentage of white blood cells in mice," Cancer Research and Cellular Therapeutics, vol. 5, no. 3, pp. 01–07, Jul. 2021, doi: 10.31579/2640-1053/088.

[25] A. N. Ufele, B. O. Mgbenka, and J. F. Ude, "Effect Of Food Supplementation On The White Blood Cells Count And Differential Leucocytes Count Of Trypanosome-Infected Pregnant Rats," Animal Research International, vol. 4, no. 2, Apr. 2008, doi: 10.4314/ari.v4i2.40809.

[26] Dr. S. A. NAYAKAWADI. Dr.S.A.NAYAKAWADI, "Effect of Sugar Industry Workplace Environment on Total White Blood Cell Count of Worker During Work," International Journal of Scientific Research, vol. 3, no. 7, pp. 523–524, Jun. 2012, doi: 10.15373/22778179/july2014/166.

[27] L. A. Sargeant, "What Does Glycated Hemoglobin Measure?," Preventive Medicine, vol. 30, no. 5, p. 438, May 2000, doi: 10.1006/pmed.2000.0662.

[28] T. Rashid and M. M. Mokji, "Low-Resolution Image Classification of Cracked Concrete Surface Using Decision Tree Technique," Lecture Notes in Electrical Engineering, pp. 641–649, 2022, doi: 10.1007/978-981-19-3923-5_55.