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MEAN PLATELET VOLUME AS A DIAGNOSTIC TOOL IN ASSESSING THE SEVERITY IN PATIENTS WITH PSORIASIS VULGARIS.

Dermatology

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ABSTRACT

Psoriasis vulgaris- as the name suggests, a non contagious most prevalent papulosquamous auto immune skin disease caused by inappropriate activation of the cellular immune system. It is characterised by focal formation of the inflamed raised plaques that constantly sheds scales derived from excessive growth of skin epithelial cells and platelet activation has been reported to be associated with its pathogenesis. It may be often reported by patients as itches, burns or stings.

It is a series of linked epidermal changes in the skin:

1.Hyperplasia of the epidermal keratinocytes

2.Vascular hyperplasia and ecstasia

3.Infiltration of T lymphocytes, neutrophils and other lymphocytes in the affected skin.

There are five main types of psoriasis : plaque, guttate, erythrodermic, inverse,pustular. Among these, plaque psoriasis is the most common one. It presents with red patches with white scales on top. The guttate type presents with drop shaped lesions. Pustular psoriasis presents with small non-infectious pus filled blisters. Erythrodermic psoriasis occurs when the rash becomes more aggressive and widespread.

There are several factors that are found to trigger Psoriasis such as streptococcus throat infections or skin infections, injury to the skin such as bug bite or severe sun burn, excessive stress, cold weather, smoking, heavy alcohol consumption and certain medications such as anti malarials, NSAIDs etc.,

Studies have revealed that there is a relationship between psoriasis and mean platelet volume. Platelets can be activated by various stimuli and its activity is known to mediate immune inflammatory response. Mean platelet volume (MPV) is considered as platelet activation marker. Mean plate volume is machine calculated measurement to determine the average size of the platelets. In fact, MPV levels are also shown to increase in cardiovascular diseases, peripheral artery disease, rheumatoid arthritis, systemic lupus erythymatosus, sclerosis, vascular dementia and Alzheimer's disease.

The relationship between Psoriasis and various haematological parameters was studied to figure out the effect of Psoriasis on haematological parameters, more importantly MEAN PLATELET VOLUME (MPV) and to find out the severity of the disease in psoriasis affected individuals. Psoriasis area and severity index (PASI) was calculated . ICMR and WHO criteria was followed for characterising Psoriasis with the below formula.

Formulae used are:

Four sites of affection, the head (h), upper limb (u), trunk (t) and lower limbs (L), will be separately scored by using three parameters:

1.erythema (E)

2.infiltration (I)

3.desquamation (D)

each of which was graded on a severity scale of 0-4, where

0 = nil,

1 = mild,

2 = moderate,

3 = severe and

4 = very severe.

The area-wise percentage involvement of the involved sites was calculated as:

1 ≤ 10% area;

2 = 10-29%;

3 = 30-49%;

4 = 50-69%;

5 = 70-89%; and

6 = more than 90%

The final formula for PASI score:

PASI = 0.1 (Eh + Ih + Dh) Ah+

0.2 (Eu + Iu + Du) Au +

0.3 (Et + It + Dt) At +

0.4 (EL + IL+ DL) AL.

This is a case-control study. Totally 100 individuals was studied. Their haematological parameters along with their psoriasis area and severity index was calculated.

KEYWORDS

psoriasis , mean platelet volume, psoriasis area and severity index, PASI, severity of psoriais

INTRODUCTION :

Involvement of the immune system in psoriasis was first indicated in early studies that identified complex infiltrates of leukocytes involved in both innate and adaptive immunity in psoriatic skin . Subsequent studies have supported the concept that interactions between dendritic cells, T cells, keratinocytes, neutrophils, and the cytokines released from immune cells likely contribute to the initiation and perpetuation of the cutaneous inflammation that is characteristic of psoriasis . A basic sequence of the immunologic events that are theorized to occur in psoriasis are:

- Antigenic stimuli contribute to the activation of plasmacytoid dendritic cells and other innate immune cells in the skin.

- Proinflammatory cytokines produced by innate immune cells, including interferon (IFN)-alpha, stimulate the activation of myeloid dendritic cells in the skin.

The immune response is mediated by the platelets. Aberrant type 1 immune responses have been linked to the pathogenesis of psoriasis. Cytokines that elicit these responses are Interleukin-23, Interleukin-12 and Interleukin-6. Interleukin-12 p40 is overexpressed in psoriasis plaque. According to WHO, MPV is higher when there is destruction of platelets.

NORMAL PLATELET VOLUME	7.5-11.5 femtolitres

This may be seen in inflammatory bowel disease, immune thrombocytopenic purpura(ITP), myeloproliferative diseases and Bernard-Soulier syndrome. It may also be related to pre-eclampsia, and recovery from, transient hypoplasia and Psoriasis. The relationship between Psoriasis and various haematological parameters was studied to figure out the effect of Psoriasis on haematological parameters, more importantly MEAN PLATELET VOLUME (MPV) and the severity of the disease in psoriasis affected individuals.

1. Correlating the haematological parameters(RBC, WBC, PLATELETS, MEAN PLATELET VOLUME (MPV) with Psoriasis.

2. Further correlating MPV and PASI with the severity of the disease.

METHODOLOGY:

TYPE AND DESIGN OF STUDY:

Performed a case-control study in a sample of both male and female psoriatic patients and healthy individuals.

STUDY POPULATION:

Subjects include males, females and children aged between 10 and 60 years who were diagnosed with psoriasis attending dermatology OPD of Chettinad Hospital and Research Institute, Kelambakkam, Chennai.

1.Control - non psoriatic healthy individuals(n=50)(10-60yrs)

2.Cases -psoriatic patients(n=50)(10-60yrs)

Sample Size:

100 individuals was studied. (case =50 , control=50)

Inclusion Criteria:

Patients with psoriasis

Exclusion Criteria:

Patients with other metabolic syndromes, cardiovascular complications, inflammatory bowel disease, haematological disorders, kidney or liver disease and any other obvious disease that will alter the haematological parameters will be excluded from the study.

DATA COLLECTION:

Personal details, medical status and any other obvious medical history will be obtained by providing proper data sheet.

Details of psoriatic involvement from Dermatology record sheet.

FACILITIES AVAILABLE IN THE INSTITUTE:

Blood sample collection: blood samples will be collected after informed consent using vacutainers.

Hematological parameters: k2 EDTA 3ml of venous blood samples will be collected by experienced phlebotomist under aseptic conditions.

All the haematological parameters including RBC, WBC, PLATELETS, MPV will be determined using automated cell counter LH-780 by Beckman-Coulter using Electrical impedance and Volume scatter conductivity methods.

Statistical Analysis:

This data was analysed using standard statistical methods using SPSS software(version 17, SPSS Inc.,Chicago, IL, USA. The relationship between variables was examined with Pearsons correlation test or Spearmans rank correlation test.

RESULTS:

Table 1: Shows The Haematological Parameters Of The Control Population.

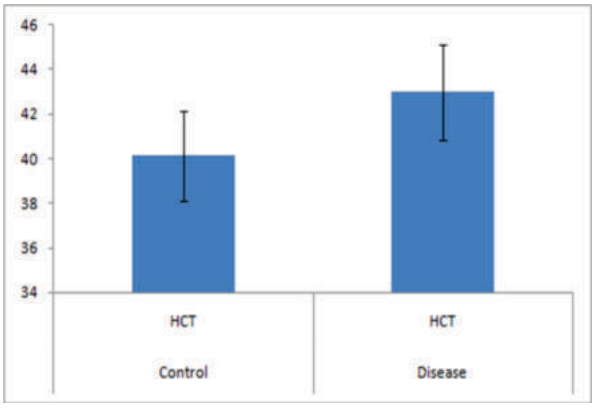
	WBC	RBC	HGB	HCT	MCV	MCH	MCHC	RDW	PLT	MPV
1	5.8	5.34	14.9	46.8	87.7	27.9	31.8	13	228	8
2	10.2	4.51	12.6	39	86.5	27.9	32.2	13.7	359	7.1
3	6.8	5.04	15.6	47.5	94.3	30.9	32.8	13.8	484	6.8
4	6.9	5.31	15.2	46.1	86.9	28..6	32.9	12	162	9.2
5	8.4	5.28	12.8	40.5	76.7	24.3	31.6	14.8	226	12.2
6	7.1	5.02	12.9	40.8	81.4	25.7	31.6	14.3	229	7.6
7	10.3	4.98	13.6	42.3	84.9	27.3	32.2	14.2	351	8.7
8	5.9	5.4	15.2	46.7	86.5	28.1	32.5	12.6	272	8.2
9	9	4.91	15.7	49	99.7	31.9	32	12.7	312	6.9
10	4.4	4.39	12.3	36.7	83.6	28	33.4	14.6	81	9.4
11	7.6	4.44	12.2	36.8	83	27.6	33.2	13.3	250	8.3
12	7.6	4.91	13	40.8	83.2	26.5	31.8	14.6	326	7.6
13	9.3	4.55	11.8	37.2	81.8	25.9	31.6	13.4	223	9.3
14	9.6	3.53	9.9	31.2	88.4	2	31.7	13.7	172	9.8
15	8.7	4.69	12.9	39.5	84.3	27.6	32.7	13.3	177	12.5
16	6.8	5.71	15.6	49.6	86.9	27.3	31.4	12.6	303	7.6
17	5.8	5.34	14.9	46.6	87.7	27.9	31.8	13	228	8
18	10.3	4.98	13.6	42.3	84.9	27.3	32.2	14.2	351	8.7
19	6.8	5.04	15.6	47.5	94.3	30.9	32.8	13.8	162	9.2
20	9.3	4.55	11.8	37.2	81.8	5.9	31.6	13.4	223	9.3
21	10.2	4.51	12.6	39	86.5	27.9	32.2	13.7	359	7.1
22	5.7	3.82	6.5	23.3	61.1	17.1	28	19.9	284	6.92
23	8.7	4.69	12.9	39.5	84.3	27.6	32.7	13.3	177	12.5
24	9.1	4.92	13.7	41.9	85.1	27.9	32.7	13.7	191	9.1
25	7.5	4.29	12	37	86.3	27.9	32.3	12.9	295	8.5
26	8.3	4.16	12.1	37.1	89.1	29	32.5	13.5	251	7.8
27	16.7	5	12.1	37.6	75.2	24.2	32.2	12.3	330	7.9
28	9.6	4.42	12.2	38.7	87.5	27.7	31.6	12.6	240	8.6
29	6.2	4.48	13.9	42.8	95.6	31	32.4	13.8	344	7.1
30	5.2	3.94	10.5	32.7	83	26.6	32	14.1	284	6.92
31	5.9	4.92	12.7	40.4	82.1	25.9	31.5	14.9	191	9.1
32	9.1	4.92	13.7	41.9	85.1	27.9	32.7	13.7	287	8.5
33	6.5	4.49	13	39.6	88.1	28.9	32.8	14.2	167	8.3
34	7.5	4.29	12	37	86.3	27.9	32.3	12.9	317	8.6
35	8.2	4.91	13.3	41.6	84.8	27.2	32	12.8	383	7.5
36	10.5	4.98	13.4	41.9	84.1	26.8	31.9	14	48	7.4
37	8.3	4.16	12.1	37.1	89.1	29	32.5	13.5	251	7.8
38	8	4.61	12.4	38.8	84.2	26.9	31.9	14.5	330	7.9
39	5.4	6.25	15.4	48.7	77.8	24.6	31.6	14.4	223	7.8
40	16.7	5	12.1	37.6	75.2	24.2	32.2	12.3	207	8
41	7.4	4.26	11.7	36.1	84.8	27.5	32.4	15.4	227	7.7
42	9.2	4.63	11.1	34.9	75.4	24	31.8	15.4	360	7
43	9.6	4.49	12.6	38.6	86	28.3	32.5	13.2	260	7.6
44	9.6	4.42	12.2	38.7	87.5	27.7	31.6	12.6	305	7.7
45	5	4.81	14.4	44.3	92.1	30	32.6	13.2	240	8.6
46	6.2	5.34	15.7	18.1	90.1	29.4	32.6	12.9	310	7.7
47	7	4.97	13.9	42.6	85.8	27.9	32.5	13.1	219	11.2
48	6.2	4.48	13.9	42.8	95.6	31	32.4	13.8	108	15
49	6.2	5.26	14.6	45.8	87	27.8	31.9	12.7	304	7.5
50	9.3	5.72	14.5	46.2	80.7	25.3	31.4	12.5	344	7.1

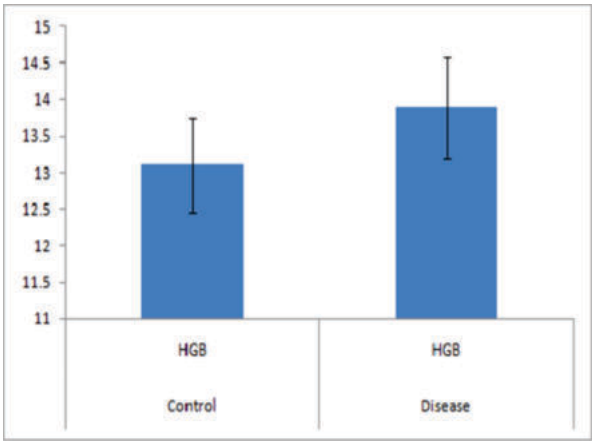
Table 2: Shows The Haematological Parameters Of The Case Population Along With Psoriasis Area And Severity Index.

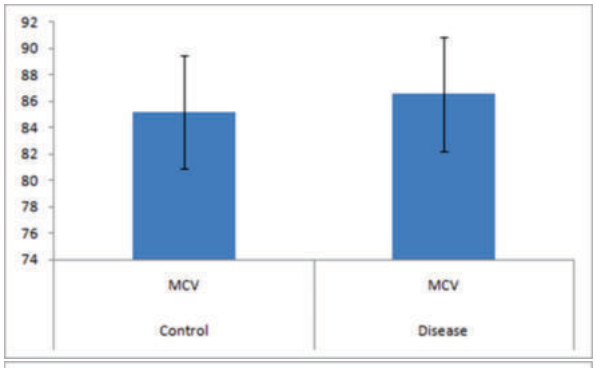
	WBC	RBC	HGB	HCT	MCV	MCH	MCHC	RDW	PLT	MPV	PASI
1	14.7	5.21	10.3	36.6	70.1	19.7	28	22.9	221	10	17.4
2	4.8	3.09	11.9	33.7	108.9	38.6	35.5	42.1	266	11.4	18.2
3	11	4.9	13.9	47.5	96.9	28.5	29.4	15.3	51	13.6	19
4	4.6	5.91	14.3	51.1	86.5	24.2	28	15.6	124	11.1	17.9
5	5.9	3.45	14.6	42.3	122.5	42.4	34.6	28	193	10.7	16
6	10.5	6.94	18	63	90.8	25.9	28.6	15.7	304	7.5	11
7	10.5	4.98	13.4	41.9	84.1	26.8	31.9	14	219	11.2	18.1
8	9.3	5.26	14.6	45.8	87	27.8	31.9	12.7	344	7.1	10.8
9	9.6	4.81	14.4	44.3	92.1	30	32.6	13.2	304	7.5	11.2
10	6.2	4.49	12.6	38.6	86	28	32.5	13.2	108	15	21
11	10.3	5.4	15.2	46.7	86.5	28.1	32.5	12.6	305	7.7	12
12	6.2	4.81	14.4	44.3	92.1	30	32.6	13.2	240	8.6	13.2
13	9.6	5.34	15.7	48.1	90.1	29.4	32.6	12.9	260	7.6	15.4
14	11.3	4.49	12.6	38.6	86	28	32.5	13.2	305	7.7	12

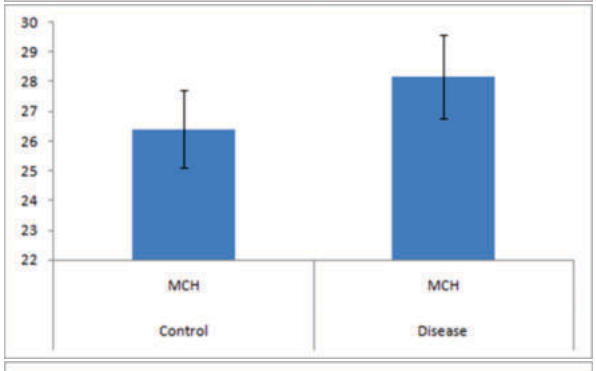
15	9.6	4.42	12.2	38.7	87.5	27.7	31.6	12.6	310	7.7	13.4
16	6.2	5.72	14.5	46.2	80.7	25.3	31.4	12.5	108	15	19.2
17	6.7	4.48	13.9	42.8	95.6	31	32.4	13.8	219	11.2	18.6
18	10.2	4.51	12.6	39	86.5	27.9	32.2	13.7	228	8	16.2
19	6.8	5.28	12.8	40.5	76.7	24.3	31.6	14.8	162	9.2	17.1
20	10.3	5.4	15.2	46.7	86.5	28.1	32.5	12.6	272	8.2	16.4
21	5.9	5.02	12.9	40.8	81.4	25.7	31.6	14.3	223	9.3	17.6
22	9.6	4.55	11.8	37.2	81.8	25.9	31.6	13.4	229	7.6	13
23	7.6	3.53	9.9	31.2	88.4	28	31.7	13.7	172	9.8	16.8
24	5.2	4.49	13	39.6	88.1	28.9	32.8	14.2	177	12.5	11
25	6.9	5.31	15.2	46.1	86.9	28.6	32.9	12	266	11.3	18
26	10.4	12.9	40.8	81.4	25.7	31.6	14.3	41.1	234	8.4	16
27	8.4	5.71	15.6	49.6	86.9	27.3	31.4	12.6	193	10.7	12.2
28	6.2	3.94	10.5	32.7	83	26.6	32	14.1	177	12.5	15.4
29	9.1	4.49	13.2	39.6	88.1	28.9	32.8	14.2	223	11.6	16.7
30	9.6	5.72	14.5	46.2	80.7	25.3	31.4	12.5	167	8.3	15.4
31	8.7	3.93	10.5	32.7	83.5	26.6	32.2	14.1	107	15.2	19
32	9.7	4.82	11.6	37.1	76.9	24.1	31.4	14.3	221	9.2	17.2
33	7.4	5.42	15	45.6	84	27.7	33	13.3	271	8.8	16.6
34	5.6	6.25	15.1	47.7	76.4	24.2	31.7	14.3	217	8	15.1
35	9.1	6.01	13.9	43.8	72.9	23.1	31.7	13.6	273	7.8	14.6
36	9.1	3.84	11	33.5	87.3	28.6	32.7	13.1	290	7.8	16.4
37	8.3	5.5	15.9	50.2	91.2	39	31.8	14.3	219	8.4	17.3
38	7.7	4.75	14.8	45.5	95.8	31.1	32.5	13.6	178	9.6	14.2
39	8.9	4.28	8.9	29.3	68.4	20.8	30.5	16.2	179	9.5	15.6
40	8.6	4.44	13.5	41.1	92.5	30.3	32.8	13.3	168	8.4	16.8
41	6.4	4.43	12.1	37.2	83.9	27.3	32.5	13.3	283	7.6	14.3
42	9.7	4.82	11.6	37.1	76.9	24.1	31.4	14.3	235	9.4	13.6
43	6.3	1.36	5.1	16.3	119.9	37.1	31	26	221	9.8	16.3
44	8.4	5.42	15	45.6	84	27.7	33	13.3	273	8.5	17.3
45	14.7	5.91	14.3	51.1	86.5	24.2	28	15.6	271	8.8	13.4
46	5.6	5.21	10.3	36.6	70.1	19.7	28	22.9	219	11.2	16.8
47	4.6	3.45	14.6	42.3	122.5	42.4	34.6	28	221	10	17.5
48	5.9	6.94	18	63	90.8	25.9	28.6	15.7	240	8.6	18.8
49	10.5	4.9	13.9	47.5	96.9	28.5	29.4	15.3	162	9.2	19.6
50	9.2	5.42	15	45.6	84	27.7	33.2	13.4	218	8.5	17.6

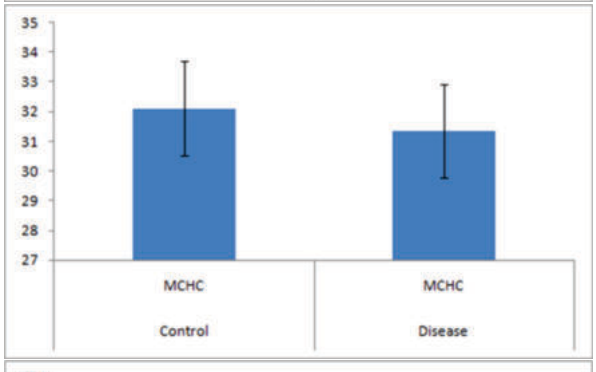
Table 3: Shows The Different Ranges Of Values Between Haematological Parameters In Healthy(control) And Diseased(case)

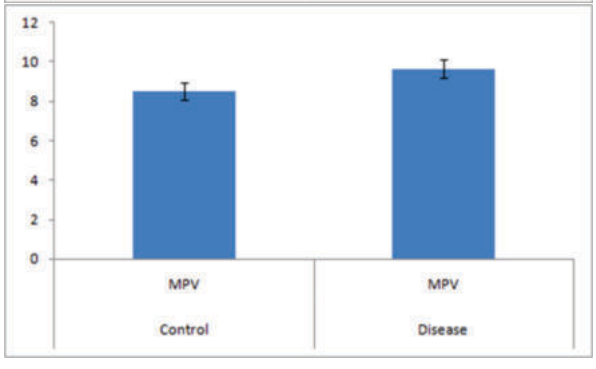


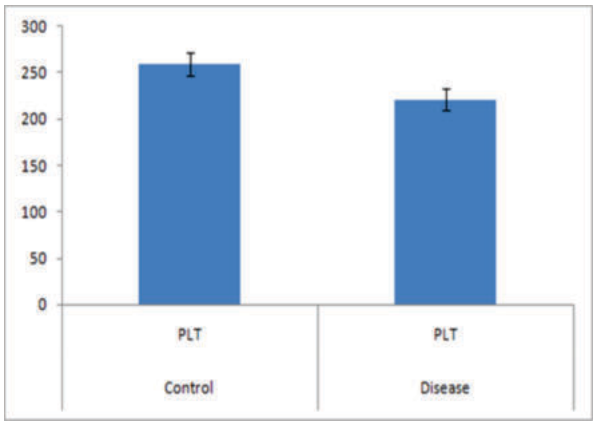












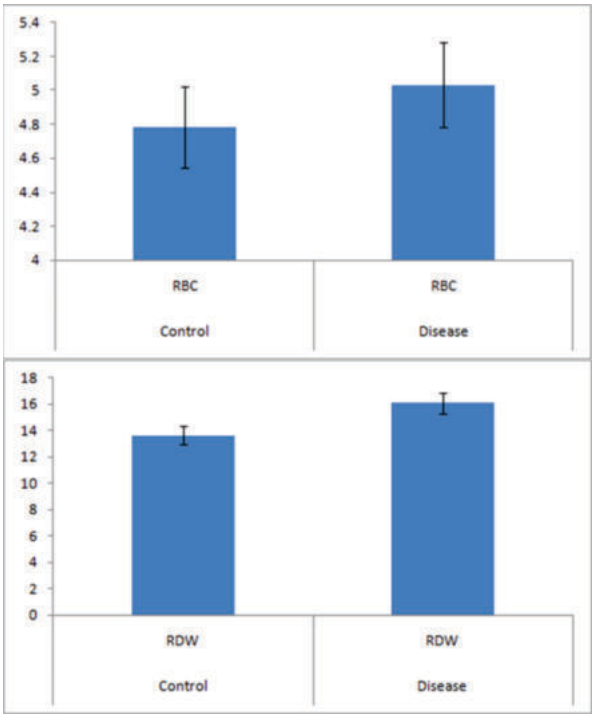


Table 4: Shows The Significant Analysis Of Comparison Between Control And Diseased And Its Correlation With The P-value: Significant Analysis

Comparison	Parameter	p-value
Control vs. Disease	MPV	0.00272
Control vs. Disease	RDW	0.01018
Control vs. Disease	PLT	0.0105
Control vs. Disease	HCT	0.07351
Control vs. Disease	MCHC	0.08265
Control vs. Disease	MCH	0.08714
Control vs. Disease	HGB	0.25085
Control vs. Disease	RBC	0.25919
Control vs. Disease	MCV	0.53597
Control vs. Disease	WBC	0.61134

Since "p" value is less than 0.05 with MPV, RDW AND Platelets, it can be used as a significant marker for identifying the severity of the psoriasis

Table 5: Shows The Correlation Analysis Between The Haematological Parameters And PASI(psoriasis area and severity index) Correlation Analysis

Factor 1	Factor 2	Correlation
HGB	PASI	-0.06
HCT	PASI	-0.08
MCV	PASI	0.06
MCH	PASI	0.08
MCHC	PASI	-0.02
PLT	PASI	-0.57
MPV	PASI	0.53
RBC	PASI	-0.08
RDW	PASI	0.18
WBC	PASI	-0.24

There is a positive correlation between PASI and MCV, MCH, MPV and RDW.

DISCUSSION:

This study accessed the haematological parameters more importantly the Mean Platelet Volume (MPV) along with the Psoriasis Area and Severity Index (PASI) in both healthy and psoriatic population aged between 10yrs and 60 yrs. Psoriasis is characterised by focal formation of the inflamed raised plaques that constantly sheds scales derived from excessive growth of skin epithelial cells and platelet activation has been reported to be associated with its pathogenesis. The study was aimed at

1. Correlating the haematological parameters(RBC, WBC, PLATELETS, MEAN PLATELET VOLUME (MPV) with Psoriasis.

2. Further correlating MPV and PASI with the severity of the disease.

And found that there is significant increase in Mean Platelet Volume in patients with Psoriasis indicating depletion of platelets in comparison with healthy individuals. Though the study aimed at MPV, other haematological parameters such as MCV, HGB, MCH, MCHC, RDW, WBC also showed significant increase in psoriatic individuals when compared to healthy individuals.

Correlating the MPV with PASI, it is found that when MPV increases, the severity of the disease is also increased to a significant value and hence MPV can be used as one of the marker in diagnosis of the severity of the psoriasis along with the PASI score.

CONCLUSION:

Platelets is one of the major component of immune response. Studies reveal that Psoriasis triggers the platelet factor 4 and increases the platelet count as it is a chronic inflammatory autoimmune disease. This study correlated the relationships between Psoriasis and MPV along with Psoriasis Area and Severity Index(PASI)and found that there was positive correlation between PASI and MPV(Mean Platelet Volume) and hence according to this study, MPV along with PASI can make be used as a marker to diagnose the severity of the disease in psoriasis affected individuals the to use of these markers in the diagnosis, treatment and management of Psoriatic patients.

SUMMARY:

In this study which included 100 individuals including 50 psoriatic individuals categorised under WHO criteria and 50 healthy individuals excluding the metabolic syndromes, it was found that all the haematological parameters showed significant increase in psoriatic individuals in comparison with healthy ones except platelets. But the MPV in relation with PASI showed positive correlation and marked rise. Hence, MPV along with PASI can be used as one of the factors in diagnosis and treatment of psoriasis.

SUGGESTIONS:

Since there were hereditary traces found in the study, future larger study may be required which include investigations with genetic correlation also.

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