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Evaluation of Anti-Arthritic Activity of Roots of *Asparagus Racemosus*

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ABSTRACT

A. Racemosus; Aqueous Extract; Paw volume; Erythrocyte sedimentation rate (ESR). *Asparagus Racemosus (Linn)* popularly called as Challan gadda belongs to Asparagaceae family. Phytochemical constituents such as Steroidal saponins, glycosides, Oligospirostanoside, Isoflavones, Furan compounds and Flavonoids have been reported in *A. Racemosus.* In the present study the roots of *Asparagus Racemosus* were studied for anti arthritic activity The antiarthritis activity was evaluated by using FCA induced arthritis model in Wistar rats. The assessment made during 32 days showed that. The parameters evaluated in this study are Body weight, Paw volume, White blood cell count (WBC),Red blood cell count (RBC),Hemoglobin count (Hb), Erythrocyte sedimentation rate (ESR). The statistical data indicated that the Aqueous Extract of *Asparagus racemosus* root (200mg/kg) and (400mg/kg) was administered 1 hr before the administration of Freund's Complete - Adjuvant (0.1ml. subplanetar region). ***P <0.05 and ***P <0.005 significant compared to control group respectively. The experimental data demonstrated that *A. Racemosus* displayed remarkable antiarthritic activity.

Keywords: Antiarthritic activity, Aqueous Extract, *A. Racemosus*

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INTRODUCTION

Arthritis is a group of conditions involving damage to the joints of the body. There are over hundred different forms of arthritis the most common form, osteoarthritis (degenerative joint disease) is result of trauma to the joint, infection of the joint, or age. Other arthritis forms are rheumatoid arthritis, psoriatic arthritis, and autoimmune diseases in which the body attacks itself. Septic arthritis is caused by joint infection. Gouty arthritis is caused by deposition of uric acid crystals in the joint, causing inflammation. There is also an uncommon form of gout caused by the formation of rhomboid crystals of calcium pyrophosphate. This gout is known as pseudo gout. India has a rich tradition of plant-based knowledge on healthcare. Many of the synthetic drugs are associated with problems like allergy, drug resistance and so on making the scientists to seek alternative drug. A large number of plants/plant extracts/decoctions or pastes are equally used by tribal and folklore traditions in India for treatment of pain. [1,2,3] Present work to investigate the effect of *Asparagus racemosus* compared with anti arthritic activity of Indomethacin.

MATERIALS AND METHOD

Rheumatoid arthritis is an autoimmune disease where in the white blood cells attack the body's own cells. In this case, the cells attacked are located in the joints, which explain the redness and warmth (accumulation of blood in the area), swelling, and pain in the joint areas. In most cases, symmetry of infection (ex: both right and left knee joints) is observed. Other symptoms are morning stiffness, fatigue, mild fever and weight loss. Shatavari, (*Asparagus racemosus)*, is a climbing plant which grows in low jungles areas throughout India. This sweet and bitter herb particularly uses balancing to Pitta Dosha. In India, Shatavari is considered the women's equivalent to Ashwagandha. It is well known for its effect on the female reproductive system.

Hence there is no report regarding the anti arthritic effect of *Asparagus racemosus,* so in this preliminary study an attempt has been made to evaluate the effects of aqueous extract *Asparagus racemosus* on experimentally induced arthritis.

Literature review[6-21] indicated that the arthritic activity of roots of *Asparagus racemosus* have not been clinically evaluated so far. An active and safe drug is needed for the treatment of arthritis. In view of this, the present study was aimed at evaluating the anti arthritic activity of the root parts of *Asparagus racemosus* against FCA in Wistar rats.

Preparation of Extract:[4]

For preparing aqueous extract the coarsely powdered plant material (100gm) was macerated for 7 days using Chloroform Water as solvent, with occasional shaking. After 7 days the solvent was

decanted, filtered and concentrated under reduced temperature and pressure to get dark colored dry residue (24.5gm).

Phytochemical screening:

The qualitative phytochemical analysis of aqueous extract of *Asparagus racemosus* showed the presence of glycosides, carbohydrates, saponins in the crude extracts.

Effects of Aqueous extract of *Asparagus racemosus* during acute toxicity studies

Aqueous root extract did not show the toxic symptoms up to the dose of 2000mg/kg body weight. All the test animals survived for 14days without showing any toxic symptoms. Based on this 1/10th (200mg/kg) and 1/5th (400mg/kg) of safe dose was selected for the antiarthritis study.

PHARMACOLOGICAL SCREENING FOR ANTIARTHRITIS ACTIVITY.

Chemicals and Instrument:

All chemicals and solvents used were obtained from S.D. Fine Chemicals and Sigma Fine Chemicals, Mumbai. Freund's Complete Adjuvant was purchased from Sigma Aldrich Chemicals. Plethysmometer (Ugo Basile, model 7140).

Freund's complete adjuvant – induced arthritis in rats: [5]

The animals were weighed, numbered and marked. The initial paw volume of each rat was noted by Plethysmometer. The animals were divided in five groups each consisting six animals.

Group 1- Normal Control group (treated with Saline 2 ml /kg b.w. p.o.)

Group 2- Toxicant control group (treated with Freund's Complete Adjuvant, 0.1ml)

Group 3-Indomethacin 10 *mg/kg* b.w. p.o + Freund's Complete Adjuvant treated.

Group 4- AEAR 200mg/kg b.w. p.o+ Freund's Complete Adjuvant treated.

Group 5- AEAR 400mg/kg b.w. p.o + Freund's Complete Adjuvant treated.

Table 1 Freund's Complete - Adjuvant induced changes in Paw Edema Volumes (ml) in normal Control Group

Sl. No	Initial Paw Volume At 0 Day	Percentage change in Paw volume(ml) at different intervals Day 8	Day 16	Day 24	Day32
1	4.10	0.97	1.46	1.95	2.68
2	3.91	0.25	0.77	1.28	1.02
3	3.97	0.50	0.25	1.01	0.75
4	3.85	0.26	0.78	1.04	1.56
5	4.18	0.24	0.00	0.48	0.48
6	4.30	0.23	0.46	0.70	0.46
Mean		0.4	0.62	1.07	1.15
± SE		0.11	0.20	0.20	0.34

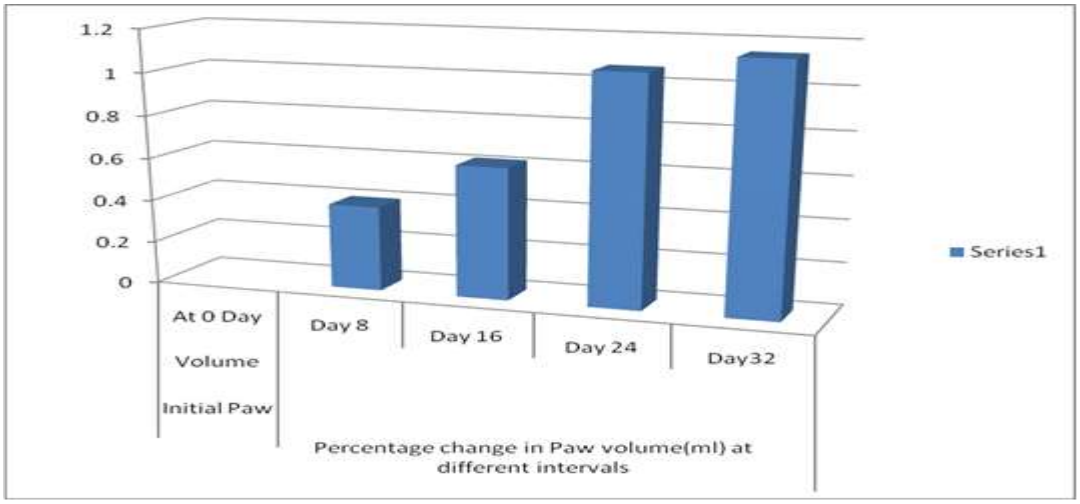

Table 2 Freund's Complete - Adjuvant induced changes in Paw Edema Volumes (ml) in Toxicant Control Group

Sl. No	Initial Paw Volume At 0 Day	Percentage change in Paw volume(ml) at different intervals			
		Day 8	Day 16	Day 24	Day32
1	3.98	39.19	57.79	67.59	80.15
2	4.10	38.53	60.24	67.32	81.22
3	4.18	38.28	60.52	66.98	87.08
4	4.26	38.50	64.08	70.66	87.32
5	4.28	40.18	68.46	78.50	89.25
6	4.31	42.69	71.46	81.20	94.20
Mean		39.56	63.76	72.04	86.54
± SE		0.68	2.16	2.55	2.13

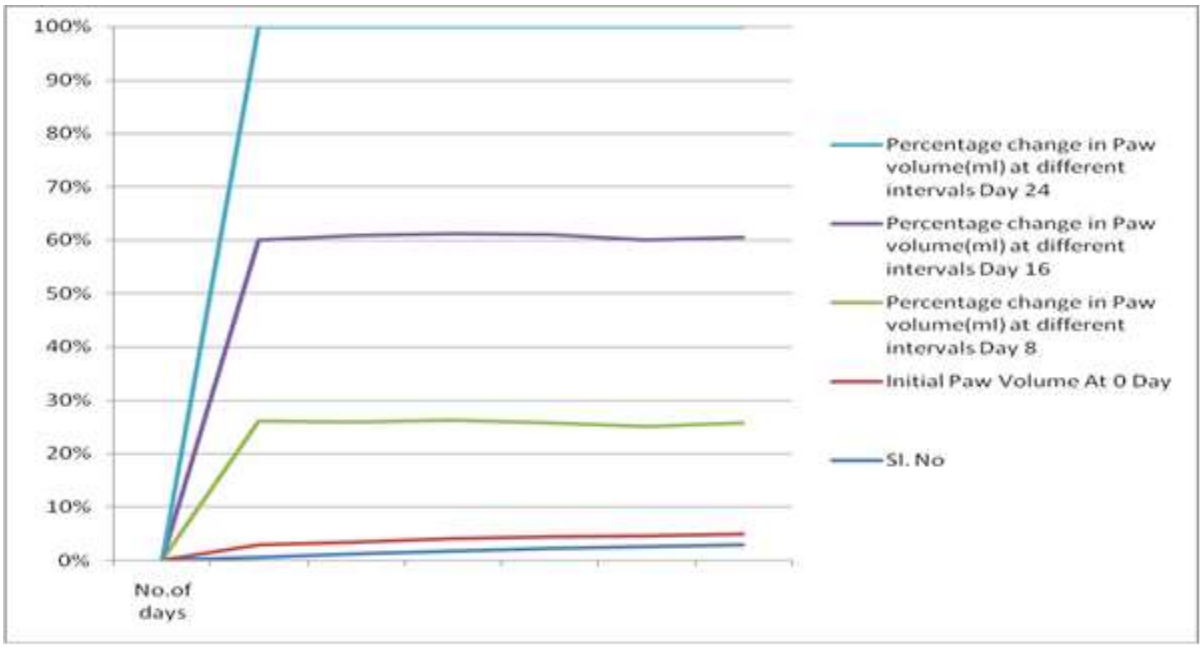

Table 3 Effect of Indomethacin On Freund's Complete - Adjuvant Induced Rats. Change in Paw Edema Volumes (ml)

Sl. No	Initial Paw Volume At 0 Day	Percentage change in Paw volume(ml) at different intervals Day 8	Day 16	Day 24	Day32
1	4.20	28.33	22.14	32.85	34.52
2	4.28	28.97	21.03	33.64	36.42
3	3.98	21.61	13.57	25.12	32.16
4	4.12	28.15	20.87	32.52	34.71
5	3.88	23.19	12.88	26.03	33.50
6	4.32	31.48	22.22	35.18	38.42
Mean		26.96***	18.79***	30.89***	34.96***
± SE		1.53	1.77	1.72	0.90
t-Value		13.78	10.98	11.90	13.91
P<value		<0.001	<0.001	<0.001	<0.001

Indomethacin (10 mg/kg b.w. i.p.) was administered 1 hr before the administration of Freund's Complete Adjuvant (0.1ml subplanetar region). *** P <0.05 significant compared to control group.

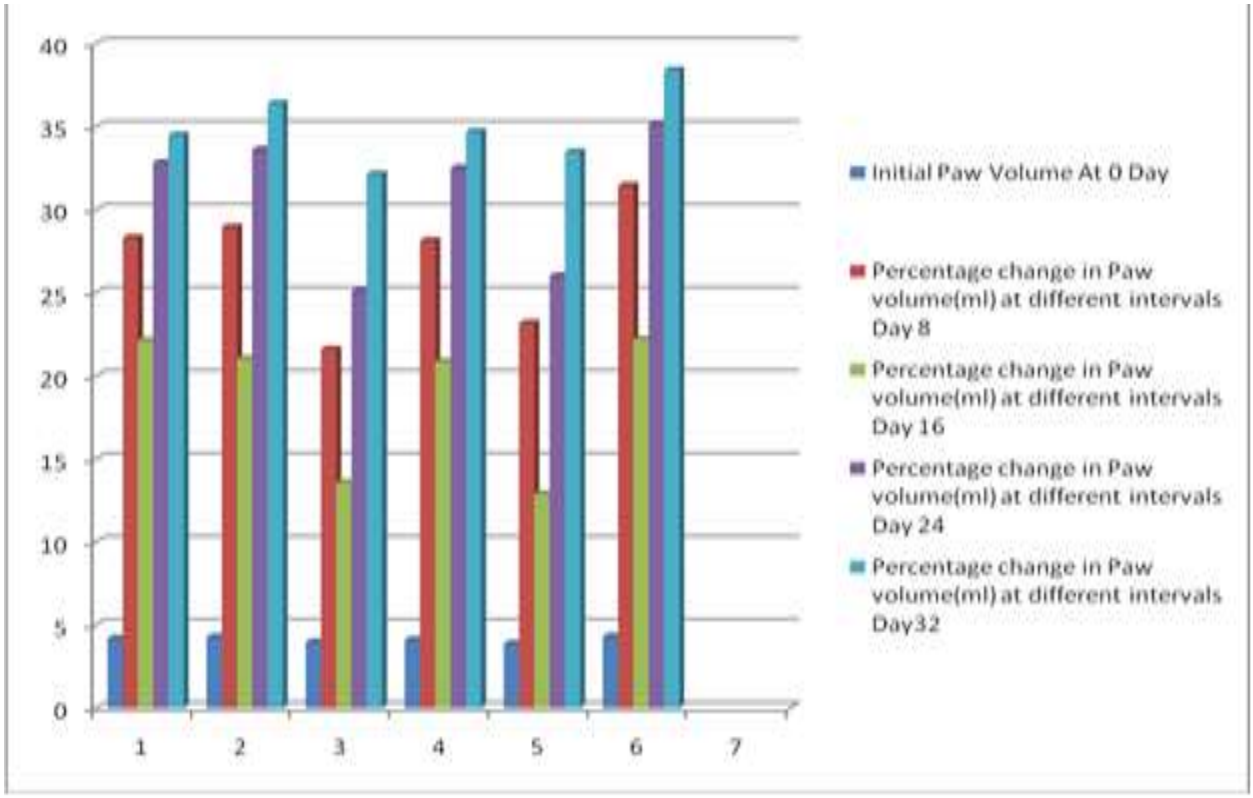

Table 4 Effect of Aqueous Extract of *Asparagus racemosus* root (200mg/kg)on Freund's Complete - Adjuvant Induced Change in Rat Paw Edema Volumes (ml)

Sl. No	Initial Paw Volume	Percentage change in Paw volume(ml) at different intervals			
	At 0 Day	Day 8	Day 16	Day 24	Day32
1	4.12	38.83	33.01	46.11	48.54
2	3.98	41.70	38.65	44.72	48.24
3	4.26	35.69	29.58	41.79	44.13
4	4.28	35.99	29.90	43.22	45.32
5	4.14	38.64	33.58	46.61	48.80
6	4.00	39.75	35.64	44.50	51.29
Mean		38.43***	33.39***	44.49***	47.72***
± SE		0.93	1.41	0.73	1.05
t-Value		10.22	3.95	8.48	8.81
P<value		<0.001	<0.001	<0.001	<0.001

Aqueous Extract of *Asparagus racemosus* root (200mg/kg) was administered 1 hr before the administration of Freund's Complete - Adjuvant (0.1ml. subplanetar region). ***P <0.05 significant compared to control group.

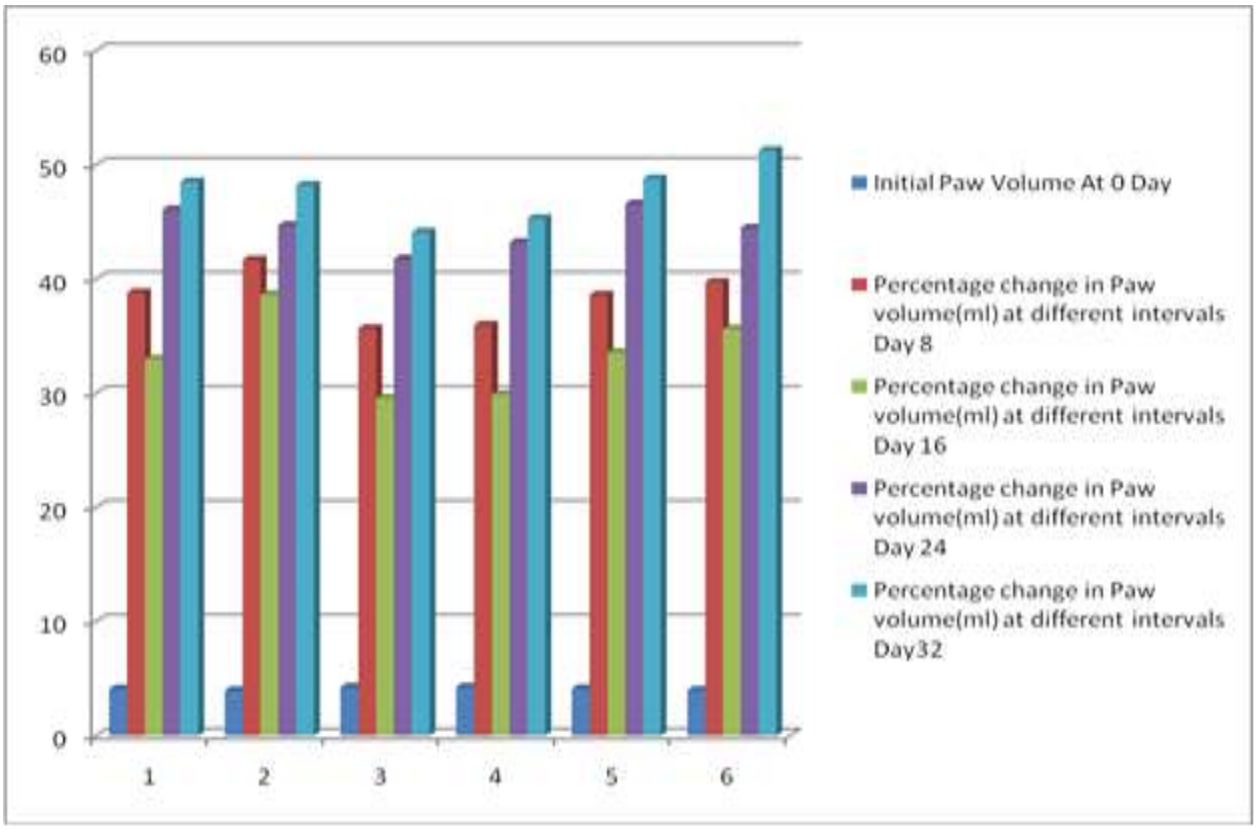

Table 5 Effect of Aqueous Extract of *Asparagus racemosus* root (400mg/kg)on Freund's Complete - Adjuvant Induced Change in Rat Paw Edema Volumes (ml)

Sl. No	Initial Paw Volume	Percentage change in Paw volume(ml) at different intervals			
	At 0 Day	Day 8	Day 16	Day 24	Day32
1	3.93	44.28	34.35	50.63	52.68
2	4.11	39.65	30.41	48.41	51.00
3	4.38	35.61	31.50	44.30	47.03
4	3.81	46.45	35.70	52.23	55.11
5	3.85	46.23	37.14	52.72	56.10
6	4.25	37.41	28.23	44.70	48.70
Mean		41.61***	32.89	48.83**	51.79***
± SE		1.90	1.38	1.50	1.45
t-Value		6.10	4.35	5.69	7.97
P<value		<0.001	<0.001	<0.01	<0.001

Aqueous Extract of *Asparagus racemosus* root (400mg/kg) was administered 1 hr before the administration of Freund's Complete - Adjuvant (0.1ml. subplanetar region). ***P <0.05 significant compared to control group.

Table 6 Freund's Complete -Adjuvant Induced Changes In Body Weight (gm) in Saline Treated Group (Control Group)

Sl. No	Changes in Body weight(gm) at different intervals				
	Day 1	Day 8	Day 16	Day 24	Day32
1	172	192	199	209	217
2	187	220	218	227	232
3	168	194	205	213	224
4	176	203	211	224	238
5	158	190	201	214	231
6	150	181	193	205	217
Mean	168.5	196.70	204.50	215.30	226.50
±SE	5.36	5.48	5.94	5.49	3.51

Table 7 Freund's Complete -Adjuvant Induced Changes In Body Weight (gm) in Saline Treated Group (Toxicant Control Group)

Sl. No	Changes in Body weight(gm) at different intervals				
	Day 1	Day 8	Day 16	Day 24	Day 32
1	165	150	148	158	150
2	172	150	147	158	154
3	195	160	155	158	152
4	170	160	155	166	155
5	182	160	158	172	168
6	169	170	165	177	174
Mean	175.50	158.33	154.70	164.83	158.83
±SE	± 4.53	± 3.43	± 2.71	± 3.37	± 3.98

Table 8 Effect of Indomethacin on Freund's Complete-Adjuvant Induced Changes in Body weight (gm)

Sl. No	Changes in Body weight(gm) at different intervals				
	Day 1	Day 8	Day 16	Day 24	Day32
1	168	191	197	199	201
2	157	169	177	183	189
3	156	168	174	177	184
4	172	189	197	203	205
5	161	172	181	187	193
6	148	165	173	179	187
Mean	160.30	175.70**	183.20**	188.00**	199.20*
±SE	3.54	4.63	4.52	4.37	3.37
t - value	2.64	3.01	5.38	4.20	1.48
P < value	< 0.05	< 0.01	< 0.01	< 0.01	< 0.5

Table 9 Effect of AEAR 200mg/kg on Freund's Complete-Adjuvant Induced Changes in Body weight (gm)

Sl. No	Changes in Body weight(gm) at different intervals				
	Day 1	Day 8	Day 16	Day 24	Day 32
1	172	192	201	208	212
2	159	177	182	192	201
3	163	187	194	203	214
4	170	197	204	213	218
5	168	188	202	214	219
6	174	193	203	211	217
Mean	167.70*	189.00***	197.70***	206.80*	213.50***
±SE	2.32	2.81	3.45	3.38	2.71
t - value	1.53	7.45	9.79	1.84	11.36
P < value	< 0.5	< 0.001	< 0.001	< 0.5	< 0.001

Table 10 Effect of AEAR 400mg/kg on Freund's Complete-Adjuvant Induced Changes in Body weight (gm)

Sl. No	Changes in Body weight(gm) at different intervals				
	Day 1	Day 8	Day 16	Day 24	Day 32
1	153	171	180	191	198
2	159	178	184	193	200
3	162	182	189	198	212
4	154	175	187	193	203
5	168	190	199	210	217
6	170	194	205	211	214
Mean	161.00*	181.70**	190.70***	199.30***	207.30***
±SE	2.87	3.62	3.87	3.65	3.26
t - value	2.71	4.62	7.62	6.96	9.42
P < value	< 0.05	< 0.01	< 0.001	< 0.001	< 0.001

Table 11 Hematological Parameters in during Freund's Complete- Adjuvant Induced Arthritis in Normal control group

SL. No.	RBC (millions/cmm)	WBC (cells/cm)	Hb (gm/100ml)	ESR (mm/hr)
1	6.84	6.50	14.80	2.20
2	7.99	6.42	13.15	2.10
3	6.82	6.54	14.25	2.48
4	7.70	6.12	13.40	2.24
5	7.99	6.38	14.50	2.88
6	7.99	6.22	13.70	2.24
Mean	7.55	6.03	13.96	2.35
± SE	0.18	0.50	0.13	0.44
t -value	--	--	--	--

Table 12:Hematological Parameters in during Freund's Complete- Adjuvant Induced Arthritis in toxicant control group

SL. No.	RBC (millions/cmm)	WBC (cells/cm)	Hb (gm/100ml)	ESR (mm/hr)
1	5.85	13.90	10.80	9.20
2	5.96	14.22	11.45	8.10
3	5.12	14.24	12.65	9.48
4	6.20	16.92	12.20	9.24
5	5.98	17.98	13.40	9.88
6	5.69	14.12	14.20	8.24
Mean	5.80	15.23	12.45	9.02
± SE	0.12	0.60	0.43	0.24
t -value	--	--	--	--
p -value	--	--	--	--

Table 13:Hematological Parameters in during Freund's Complete- Adjuvant Induced Arthritis in Indomethacin treated group

SL. No.	RBC (millions/cmm)	WBC (cells/cm)	Hb (gm/100ml)	ESR (mm/hr)
1	7.14	7.12	12.50	1.82
2	7.49	6.98	15.20	1.87
3	8.20	6.88	15.40	1.92
4	8.14	6.82	14.60	1.72
5	7.68	8.20	14.85	1.89
6	7.22	8.32	14.90	2.00
Mean	7.64*	7.38***	14.57*	1.87***
± SE	0.15	0.23	0.36	0.03
t -value	0.10	12.26	0.21	29.79

Table 14 Hematological Parameters in during Freund's Complete- Adjuvant Induced Arthritis in AEAR (200mg/kg) treated group

SL. No.	RBC (millions/cmm)	WBC (cells/cm)	Hb (gm/100ml)	ESR (mm/hr)
1	6.98	6.20	13.24	2.20
2	7.12	7.10	14.20	2.02
3	7.18	7.44	13.58	1.85
4	8.10	8.68	13.00	1.92
5	7.50	8.94	13.28	1.98
6	7.64	9.20	14.20	2.10
Mean	7.42***	7.92***	13.58*	2.01*
± SE	0.14	0.41	0.17	0.04
t -value	10.8	10.15	1.89	0.043
p -value	< 0.001	< 0.001	< 0.5	< 0.5

Table 15 Hematological Parameters in during Freund's Complete- Adjuvant Induced Arthritis in AEAR (400mg/kg) treated group

SL. No.	RBC (millions/ cmm)	WBC (cells/cm)	Hb (gm/100ml)	ESR (mm/hr)
1	8.87	8.44	13.10	1.88
2	7.43	7.81	14.22	2.12
3	7.61	8.20	14.68	2.14
4	7.76	9.10	15.10	2.00
5	7.97	9.34	16.38	2.18
6	8.20	7.98	16.12	2.14
Mean	7.97*	8.48***	14.93*	2.07***
± SE	1.17	0.21	0.42	0.03
t -value	1.85	10.82	0.76	31.59

WBC count, ESR rate, paw volume to be raised in arthritis condition, RBC count, Hb percentage and body weight decreases in arthritis condition. In our study aqueous extract significantly reduce the WBC count, ESR rate, paw volume and increases RBC count, Hb percentage and body weight.

CONCLUSION

From the results observed in the current investigation, it may be concluded that the aqueous extract of roots of *Asparagus racemosus* potentially possess anti arthritic properties.

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