

**A COMPARATIVE CLINICAL STUDY TO EVALUATE THE IMMUNOMODULATORY EFFECT OF KUSHMAND KHAND AND ASHWAGANDHA RASAYAN IN LOWERING DOWN THE MORBIDITY PATTERN IN CHILDREN****Dr. Jyoti Kaushik\*<sup>1</sup> and Prof. Rakesh Sharma<sup>2</sup>**<sup>1</sup>Assistant Professor, Department of *Kaumarbhritya*, Prem Raghu Ayurvedic Medical College & Hospital, Hathras, Uttar Pradesh- 204101.<sup>2</sup>Head, P.G. Department. of *Kaumarbhritya*, Rajiv Gandhi Govt. P.G. Ayurvedic Medical College & Hospital, Paprola, Himachal Pradesh- 176115.**\*Corresponding Author: Dr. Jyoti Kaushik**Assistant Professor, Department of *Kaumarbhritya*, Prem Raghu Ayurvedic Medical College & Hospital, Hathras, Uttar Pradesh- 204101.DOI: <https://doi.org/10.17605/OSF.IO/3TNRU>

Article Received on 18/01/2021

Article Revised on 08/02/2021

Article Accepted on 28/02/2021

**ABSTRACT**

**Introduction:** A child who enjoys a better state of health during childhood will become a healthy adult. About 5 million children die every year in childhood due to contagious diseases due to lack of immunity. The present study has been planned to evaluate the immunomodulatory effect of *Kushmand Khand* and *Ashwagandha Rasayan* in lowering down the morbidity pattern in children. **Aims & objectives:** To study the immunomodulatory effect of *Kushmand Khand* and *Ashwagandha Rasayan* in lowering down the morbidity pattern in children. **Materials & methods:** The study was conducted over a period of 3 months on 45 patients aged between 3-12 years who were suffering from recurrent GIT, respiratory tract infections and a case proforma was filled with the data obtained by interrogation, physical examination and collection of details of each child. **Results:** Both *Kushmand Khand* and *Ashwagandha Rasayan* showed beneficial effect in lowering down the morbidities in children compared to control group. **Conclusion:** The study concludes that both *Kushmand Khand* and *Ashwagandha Rasayan* have immunomodulatory action and hence can be effective in lowering down the morbidity rate in children.

**KEYWORDS:** Immunity, Immunomodulators, Morbidity, *Kushmand Khand*, *Ashwagandha Rasayan*.**INTRODUCTION**

Childhood is a period typified by change, both in the child and in the immediate environment. The early childhood years are a period of great opportunity but also great vulnerability. Despite remarkable progress in child survival in past few decades, according to an UNICEF data, 5.2 million children under five years of age died in 2019 worldwide and most of them are due to diseases which are highly preventable.

The immune system of our body acts as a protecting shield against various pathogenic microbes like bacteria, virus, fungi and some free radicals. As children have a less developed immune system, they are more prone to various infections and often more frequently than adults. In this regard immunization have efficacy to the limited disease and for recurrent infections rational use of antibiotics is the need of today.

In present scenario, there are ongoing trends of immunomodulation to combat a vast range of human and animal diseases like viral diseases, cancers, autoimmune diseases etc. Immunomodulatory drugs modify the response of the immune system either by increasing

(immunostimulators) or by decreasing (immunosuppressives) the production of serum antibodies.

The concept of immunity in modern science is closer to *Ayurvedic* principles of *Vyadhikshamatva*, *Ojas* and *Bala*. In *Ayurvedic* practice, the objective of immunomodulation is achieved through the use of *Rasayan*, *Balya* and *Ojovridhikara* drugs which are reputed to promote physical and mental health, improve defense mechanism of the body and enhance longevity. Keeping these in mind this study is planned to evaluate the effect of *Kushmand Khand* and *Ashwagandha Rasayan* as immunomodulators in lowering down the morbidity pattern in children.

**AIMS AND OBJECTIVES**

1. To study the efficacy of both trial drugs in lowering down the morbidity in children.
2. To compare the efficacy of both drugs.

**MATERIALS AND METHODS**

For the present study, total 45 patients were registered from the *Kaumarbhritya/Balrog* OPD/IPD, R G G P G Ayurvedic College & Hospital, Paprola, randomly

fulfilling the criteria of this study. A case proforma was filled with the data obtained by interrogation, physical examination and collection of details of each child.

Inclusion criteria	Exclusion criteria
Age eligibility – 3 to 12 years.	The patient who is suffering with any congenital, hereditary or acute systemic illness.
Gender eligibility – Both male and female.	Patients who do not fulfill the criteria of inclusion
Patients who are suffering from recurrent GIT, Respiratory tract infections.	Patient who has been dropped on subsequent follow up.
Patients who are willing to participate in the trial.	Whose parents have refused to participate in the study.
Patients whose parents will give their written informed consent.	

**Grouping of the patients**

Study was conducted on 45 selected patients in three groups:

- GROUP - A – 15 patients in this group were given *Kushmand Khand*.

- GROUP - B – In this group 15 patients were given the trial drug *Ashwagandha Rasayan*.
- GROUP - C – No medication were given to the 15 patients of this group

**Treatment schedule.**

Particulars	Group A	Group B	Group C
Drug	<i>Kushmand Khand</i>	<i>Ashwagandha Rasayan</i>	No medication
Dosage	250-500mg/kg/day	250-500mg/kg/day	-
Anupana	milk	milk	-
Duration	30 days	30 days	30 days

\*Follow ups: 3 follow ups at 4, 8, 12 weeks

**RESULTS****Assessment of drug response**

All the reported illnesses (fever, running nose, cough, sore throat, enlarged tonsil, pain abdomen, diarrhoea) were assigned scores (from 0= normal to 3= severe) depending upon their severity and frequency to assess the effect of the drugs objectively before and after treatment and also by considering the changes found in

the laboratory investigations (Serum IgG, Hb%, TLC, Neutrophils, Lymphocytes, Monocytes, ESR) before and after treatment.

**Demographic and baseline characteristics**

Patients in all 3 groups were compared at baseline in demographic and disease characteristics (Table 1).

**Table 1: Demographic & baseline characteristics.**

	Group A (n= 15)	Group B (n= 15)	Group C (n= 15)
<b>Age (yr)</b>			
3-5	9	9	10
6-8	4	5	2
9-12	2	1	3
<b>Gender</b>			
male	9	7	9
female	6	8	6
<b>Religion</b>			
Hindu	15	15	15
Others	0	0	0
<b>Habitat</b>			
rural	10	12	11
urban	5	3	4
<b>Socio economic status</b>			
Lower	4	4	5
Middle	10	6	8

<i>Higher</i>	1	5	2
<b>Family type</b>			
<i>Joint</i>	6	3	4
<i>Nuclear</i>	9	12	11
<b>Diet</b>			
<i>Vegetarian</i>	8	6	8
<i>Mixed</i>	7	9	7
<b>Clinical presentation</b>			
<i>Fever</i>	10	10	10
<i>Running nose</i>	12	10	9
<i>Cough</i>	8	9	9
<i>Sore throat</i>	7	6	7
<i>Enlarged tonsils</i>	9	8	7
<i>Pain abdomen</i>	5	5	4
<i>Diarrhoea</i>	4	5	4
<b>Mean (SD) lab. values</b>			
<i>Serum IgG (g/L)</i>	5.993(1.67)	6.667(1.62)	6.660(0.29)
<i>Haemoglobin (g/dl)</i>	11.147(0.66)	12.560(0.62)	10.833(0.30)
<i>TLC (x 10<sup>3</sup>/cu.mm.)</i>	8.413(2.14)	6.627(2.44)	6.200(1.65)
<i>Neutrophil (%)</i>	50.513(4.75)	56.107(4.39)	49.767(6.97)
<i>Lymphocytes (%)</i>	40.733(4.99)	36.187(10.39)	40.267(6.46)
<i>Monocytes (%)</i>	8.753(2.29)	7.693(3.05)	9.960(4.74)
<i>ESR (mm/1<sup>st</sup> hour)</i>	14.467(7.19)	12.867(8.56)	7.667(1.29)

#### Statistical analysis

The result obtained from the study were subjected to statistical analysis in term of mean, standard deviation(SD) and standard error (SE), t value, P value and F values in paired 't' test and ANOVA test, carried out at

- $P > 0.05$ : Insignificant

- $P < 0.05$ ,  $P < 0.01$ : Significant
- $P < 0.001$ : Highly significant

When a significant 'P' value has been found using ANOVA, a post hoc comparison (Holm-Sidak method) has been conducted between pairs of treatments to know which means differ significantly.

**Table 2: Assessment of the reported illnesses depending upon their severity (before & after treatment).**

	Groups	Mean		% relief	SD±	SE±	't' value	P value
		BT	AT					
<i>Fever</i>	Gr A	1.900	0.800	57.89	0.568	0.180	6.128	<0.001
	Gr B	1.600	0.600	62.50	0.943	0.298	3.354	0.008
	Gr C	1.300	1.200	7.69	0.568	0.180	0.557	0.591
<i>Running nose</i>	Gr A	1.583	0.583	63.17	0.603	0.174	5.745	<0.001
	Gr B	1.800	0.800	55.56	0.471	0.149	6.708	<0.001
	Gr C	1.778	1.667	6.24	0.601	0.200	0.555	0.594
<i>Cough</i>	Gr A	1.875	0.500	73.33	0.518	0.183	7.514	<0.001
	Gr B	1.889	0.778	58.81	0.782	0.261	4.264	0.003
	Gr C	1.667	1.556	6.59	0.928	0.309	0.359	0.729
<i>Sore throat</i>	Gr A	1.429	0.571	59.97	0.690	0.261	3.286	0.017
	Gr B	1.333	0.500	62.49	0.753	0.307	2.712	0.042
	Gr C	1.857	1.714	7.70	0.690	0.261	0.548	0.604
<i>Enlarged tonsils</i>	Gr A	1.889	0.667	64.69	0.833	0.278	4.400	0.002
	Gr B	1.875	0.625	66.67	0.707	0.250	5.000	0.002
	Gr C	1.714	1.571	8.34	0.690	0.261	0.548	0.604
<i>Pain abdomen</i>	Gr A	2.000	1.000	50.00	0.707	0.316	3.162	0.034
	Gr B	2.000	0.800	60.00	0.837	0.374	3.207	0.033
	Gr C	2.000	1.750	12.50	0.957	0.479	0.522	0.638
<i>Diarrhoea</i>	Gr A	1.250	0.500	60.00	0.500	0.250	3.000	0.058
	Gr B	1.600	0.800	50.00	0.837	0.374	2.138	0.099
	Gr C	1.000	0.750	25.00	0.500	0.250	1.000	0.391

[BT= before treatment, AT= after treatment]

Table 3: Assessment of the reported illnesses depending upon their frequency (before &amp; after treatment).

	Groups	Mean		% relief	SD±	SE±	't' value	P value
		BT	AT					
<i>Fever</i>	Gr A	1.700	0.700	58.82	0.816	0.258	3.873	0.004
	Gr B	2.100	0.700	66.67	1.075	0.340	4.118	0.003
	Gr C	1.600	1.400	12.50	0.789	0.249	0.802	0.443
<i>Running nose</i>	Gr A	1.833	0.750	59.08	1.165	0.336	3.223	0.008
	Gr B	2.400	0.900	62.5	1.080	0.342	4.392	0.002
	Gr C	2.000	1.778	11.10	0.667	0.222	1.000	0.347
<i>Cough</i>	Gr A	2.250	0.875	61.11	1.061	0.375	3.667	0.008
	Gr B	1.444	0.667	53.81	0.667	0.222	3.500	0.008
	Gr C	1.556	1.444	7.19	1.167	0.389	0.286	0.782
<i>Sore throat</i>	Gr A	2.000	0.714	64.30	0.488	0.184	6.971	<0.001
	Gr B	2.500	0.833	66.68	0.816	0.333	5.000	0.004
	Gr C	2.143	1.857	13.35	0.756	0.286	1.000	0.356
<i>Enlarged tonsils</i>	Gr A	2.000	0.778	61.10	0.833	0.278	4.400	0.002
	Gr B	2.000	0.750	62.50	1.165	0.412	3.035	0.019
	Gr C	1.429	1.143	20.01	0.951	0.360	0.795	0.457
<i>Pain abdomen</i>	Gr A	1.800	1.000	44.44	0.837	0.374	2.138	0.099
	Gr B	2.000	1.200	40.00	0.837	0.374	2.138	0.099
	Gr C	1.250	1.000	20.00	0.500	0.250	1.000	0.391
<i>Diarrhoea</i>	Gr A	1.750	0.500	71.43	0.500	0.250	5.000	0.015
	Gr B	1.800	0.800	55.56	1.000	0.447	2.236	0.089
	Gr C	1.500	1.000	33.33	0.577	0.289	1.732	0.182

[BT= before treatment, AT= after treatment]

Table 4: Intergroup comparisons of severity of illnesses.

	Mean difference (BT-AT)			SST	MST	F	P Value by ANOVA
	Group A	Group B	Group C				
<i>Fever</i>	1.100	1.000	0.100	19.867	1.375	6.882	0.006
<i>Running nose</i>	1.000	1.000	0.111	13.935	0.465	6.800	0.007
<i>Cough</i>	1.375	1.111	0.111	21.385	0.855	5.459	0.017
<i>Sore Throat</i>	0.857	0.833	0.143	10.800	0.568	2.811	0.103
<i>Enlarged Tonsils</i>	1.222	1.250	0.143	17.833	0.775	5.711	0.017
<i>Pain Abdomen</i>	1.000	1.200	0.250	9.714	0.747	1.006	0.413
<i>Diarrhoea</i>	0.750	0.800	0.250	5.077	0.423	1.615	0.275

[BT= before treatment, AT= after treatment]

Table 5: Intergroup comparisons of frequency of illnesses.

	Mean difference (BT-AT)			SST	MST	F	P Value by ANOVA
	Group A	Group B	Group C				
<i>Fever</i>	1.100	1.000	0.100	19.867	1.375	6.882	0.006
<i>Running nose</i>	1.000	1.000	0.111	13.935	0.465	6.800	0.007
<i>Cough</i>	1.375	1.111	0.111	21.385	0.855	5.459	0.017
<i>Sore Throat</i>	0.857	0.833	0.143	10.800	0.568	2.811	0.103
<i>Enlarged Tonsils</i>	1.222	1.250	0.143	17.833	0.775	5.711	0.017
<i>Pain Abdomen</i>	1.000	1.200	0.250	9.714	0.747	1.006	0.413
<i>Diarrhoea</i>	0.750	0.800	0.250	5.077	0.423	1.615	0.275

[BT= before treatment, AT= after treatment]

Table 6: Pairwise Multiple Comparisons (Holm-Sidak method).

	Comparison	Diff. of Means	T	Unadjusted P	Critical Level	Significance
<i>Fever (severity)</i>	Gr. A vs Gr. C	1.000	3.368	0.00342	0.017	Yes
	Gr. B vs Gr. C	0.900	3.031	0.00718	0.025	Yes
	Gr. A vs Gr. B	0.100	0.337	0.740	0.050	No
<i>Running nose (severity)</i>	Gr. A vs Gr. C	0.889	3.234	0.00487	0.017	Yes
	Gr. B vs Gr. C	0.889	3.011	0.00787	0.025	Yes
	Gr. A vs Gr. B	0.000	0.000	1.000	0.050	No
<i>Cough (severity)</i>	Gr. A vs Gr. C	1.188	3.004	0.00891	0.017	Yes
	Gr. B vs Gr. C	1.000	2.645	0.0184	0.025	Yes
	Gr. A vs Gr. B	0.188	0.474	0.642	0.050	No
<i>Sore throat (frequency)</i>	Gr. A vs Gr. C	1.000	2.626	0.0236	0.025	Yes
	Gr. B vs Gr. C	1.250	3.095	0.0102	0.017	Yes
	Gr. B vs Gr. A	0.250	0.619	0.549	0.050	No
<i>Enlarged tonsils (severity)</i>	Gr. A vs Gr. C	1.205	3.120	0.00812	0.017	Yes
	Gr. B vs Gr. C	1.080	2.666	0.0194	0.025	Yes
	Gr. B vs Gr. A	0.125	0.340	0.739	0.050	No

Table 7: Assessment of laboratory investigations (before &amp; after treatment).

	Groups	Mean		SD±	SE±	't' value	P value
		BT	AT				
<i>IgG</i>	Gr A	5.993	11.233	1.667	0.430	12.176	<0.001
	Gr B	6.667	11.647	1.623	0.419	11.883	<0.001
	Gr C	6.660	6.800	0.297	0.076	1.825	0.089
<i>Haemoglobin</i>	Gr A	11.147	11.867	0.656	0.169	4.251	<0.001
	Gr B	12.560	13.120	0.624	0.161	3.474	0.004
	Gr C	10.833	11.487	0.300	0.077	8.443	<0.001
<i>TLC</i>	Gr A	8.413	5.953	2.142	0.553	4.447	<0.001
	Gr B	6.627	4.860	2.444	0.631	2.799	0.014
	Gr C	6.200	5.300	1.645	0.425	2.119	0.052
<i>Neutrophil (%)</i>	Gr A	50.513	50.553	4.746	1.225	-0.033	0.974
	Gr B	56.107	54.787	4.388	1.133	1.165	0.263
	Gr C	49.767	50.540	6.973	1.800	-0.430	0.674
<i>Lymphocytes (%)</i>	Gr A	40.733	43.207	4.991	1.289	1.919	0.076
	Gr B	36.187	37.440	10.39	2.685	0.467	0.648
	Gr C	40.267	42.407	6.462	1.668	1.283	0.220
<i>Monocytes (%)</i>	Gr A	8.753	6.240	2.287	0.590	4.257	<0.001
	Gr B	7.693	5.453	3.054	0.789	2.840	0.013
	Gr C	9.960	7.833	4.742	1.224	1.737	0.104
<i>ESR</i>	Gr A	14.467	6.733	7.186	1.855	4.168	<0.001
	Gr B	12.867	5.933	8.556	2.209	3.138	0.007
	Gr C	7.667	6.333	1.291	0.333	4.000	0.001

[BT= before treatment, AT= after treatment]

Table 9: Intergroup comparison of laboratory investigations results.

	Mean difference (BT-AT)			SST	MST	F	P Value by ANOVA
	Group A	Group B	Group C				
<i>IgG</i>	-5.240	-4.980	-0.140	324.532	125.592	67.490	<0.001
<i>Haemoglobin</i>	-0.720	-0.560	-0.653	12.931	0.630	0.257	0.775
<i>TLC</i>	2.460	1.767	0.900	204.116	18.163	2.145	0.136
<i>Neutrophil (%)</i>	-0.040	1.320	-0.773	1299.356	80.749	0.637	0.536
<i>Lymphocytes (%)</i>	-2.473	-1.253	-2.140	2459.171	127.11	0.111	0.895
<i>Monocytes (%)</i>	2.513	2.240	2.127	519.768	23.901	0.0432	0.958
<i>ESR</i>	7.733	6.933	1.333	2136.000	264.157	4.075	0.028

[BT= before treatment, AT= after treatment]

Table 10: Pairwise Multiple Comparisons (Holm-Sidak method).

	Comparison	Diff. of Means	T	Unadjusted P	Critical Level	Significance
<b>IgG</b>	Gr. A vs Gr. C	5.100	10.314	4.419013	0.017	Yes
	Gr. B vs Gr. C	4.840	9.788	2.117012	0.025	Yes
	Gr. B vs Gr. A	0.260	0.526	0.602	0.050	No
<b>ESR</b>	Gr. A vs Gr. C	6.400	2.620	0.0140	0.017	Yes
	Gr. B vs Gr. C	5.600	2.292	0.0296	0.025	No
	Gr. B vs Gr. A	0.800	0.327	0.746	0.050	No

## DISCUSSION

Group A (*Kushmand Khand*) showed highly significant improvement in morbidity features like severity of fever and cough, frequency of sore throat. Insignificant improvement was observed in features like frequency of pain abdomen and severity of diarrhoea. In other morbidity features it showed significant improvement. In Group B (*Ashwagandha Rasayan*) feature like severity of running nose showed highly significant improvement. In other morbidity features significant result except in pain abdomen (frequency) and diarrhea (severity, frequency) were observed. Insignificant improvement in all feature

were seen in Group C. In intergroup comparison significant improvement in Group A and Group B over Group C was observed in parameters like severity of fever, running nose, cough, tonsillitis and frequency of sore throat. However, insignificant changes were present between Group A and Group B in the above parameters. Increase in serum IgG level was found significant in Group A and Group B over Group C suggesting effectiveness of both the drugs in immunomodulation.

The following tables depict the contents of both drugs along with their *Karma* and pharmacological actions.

Table 11: *Kushmand Khand*.

Ingredients	<i>Karma</i>	Action based on Pharmacological studies
<i>Kushmand</i>	<i>Balya, Deepana, Vrisya, Jeernangapushtiprada, Tridosahara, Rasayan</i>	Anti-oxidant, Anti-microbial, Antipyretic activity
<i>Pippali</i>	<i>Deepana, Ruchya, Rasayan, Balya, Vrisya, Tridosahara, Raktashodhaka</i>	Immunomodulatory, Antioxidant, Hepatoprotective, Antimicrobial, Anti-inflammatory activity
<i>Shunthi</i>	<i>Deepana, Pachana, Shwasahara</i>	Antioxidant, Antibacterial, Anti diarrhoeal, Anti-inflammatory, Gastroprotective effect
<i>Shvetajiraka</i>	<i>Balya, Deepana, Pachana, Krimighna, Jvarahara</i>	Antimicrobial, Antioxidant, Immunomodulatory, Bioavailability enhancer
<i>Tejpatra</i>	<i>Ruchya</i>	Antibacterial Effects, Immunomodulatory activity, Anti-inflammatory activity
<i>Suksmaila</i>	<i>Rochana, Deepana, Balya</i>	Antibacterial Activity, Antioxidant activity, Anti-inflammatory, Analgesic & Antispasmodic Activity, Gastroprotective Activity
<i>Maricha</i>	<i>Pachana, Deepana, Yakriduttejaka, Krimighna, Kaphanissaraka</i>	Immuno-modulatory activity, Antioxidant activity, Antimicrobial activity, Hepatoprotective activity, Anti-diarrheal activity
<i>Tvaka</i>	<i>Pachana, Deepana, Ruchya, Grahi, Krimiroga, Ojovardhaka</i>	Antioxidant Activity, Anti-Inflammatory, Antimicrobial activity
<i>Dhanyaka</i>	<i>Deepana, Grahi, Pacana, Shoolahara, Srotovishodhana</i>	Antioxidant Activity, Anti-microbial Activity, Hepatoprotective activity, Anthelmintic activity
<i>Ghee</i>	<i>Agni Deepana, Balya, Vrishya, Ojovardhaka, Rasayana, Balya, Yogavahi</i>	Fat, Protein, Vitamin A, E, K
<i>Khanda</i>	<i>Jvarahanti, Dahahar</i>	Energy
<i>Madhu</i>	<i>Chedana, Sandhan</i>	Vitamin A, E and K. protein, Ca, P, K, Sa, choline, betacarotene, Antibacterial activity, Antioxidant property, Anti-inflammatory and immunomodulatory activities

Table 12: *Ashwagandha Rasayan*.

Ingredients	<i>Karma</i>	Action based on pharmacological studies
<i>Ashwagandha</i>	<i>Deepana, Balya, Brimhana, Rasayana</i>	Immunomodulatory activity, Antibiotic activity, Antioxidant effect, Anti-inflammatory activity

## CONCLUSION

Children are constantly growing. Their central nervous system, immune, reproductive and digestive systems are still developing and they have little control over their environment. These make them vulnerable to various diseases. Ayurveda has ample of drugs which amplify the immune system and hence protects from diseases. The present study reveals that both *Kushmand Khand* and *Ashwagandha Rasayan* work like immunomodulators which decreased/ lowered down the morbidity rate and therefore can be a simple and cost effective remedy to bring down the morbidity rate in children.

## REFERENCES

1. <https://data.unicef.org/topic/child-survival/under-five-mortality/>.
2. Avorn J. Learning about the Safety of Drugs. A Half-Century of Evolution. *N Engl J Med*, 2011; 365: 2151-3.
3. Panjgotra S, Bali A, Angurana S. Oja: The Concept of Vyadishamatva (Immunity) in Ayurveda. *WJPLS*, 2018; 4(9): 59-60.
4. Aparna Singh Et Al: Oja Vis-À-Vis Immunology In Ayurveda. *International Ayurvedic Medical Journal* {online}, 2017.
5. Masram P, Chaudhary S, Patel KS, Kori VK, Rajagopala S. A Brief Review on Ayurvedic Concept of Immunity and Immunization. *Ayurpharm Int J Ayur Alli Sci.*, 2014; 3(8): 230-240.
6. Charaka Samhita "Vidyotini" Hindi Commentary by Pt. Kashinath Shastri and Dr. Gorakhnath Shastri, Chaukhamba Bhauati Academy, Varanasi, Sutrasthana, Chapter, 1998; 27(8).
7. Bhaishajya Ratnavali of Shri Govinda Das, by Shri Kaviraja Ambikadatta Shastri, Chaukhambha Prakashan, Varanasi, Raktipitta Chikitsa Prakaran, 2012; 13/95-101.
8. Bhaishajya Ratnavali of Shri Govinda Das, by Shri Kaviraja Ambikadatta Shastri, Chaukhambha Prakashan, Varanasi, Rasayan Prakran, 2012; 73/10.
9. *Ayurvedic Pharmacopea of India*, I: 4.
10. V Vijayan, Neethu P, Athulya CM, A Rajesh. A review on Kushmanda (*Benincasa hispida*) with special reference to Visha Chikitsa. *The Pharma Innovation Journal*, 2018; 7(12): 245-248.
11. Database on medicinal plants used in Ayurveda by CCRAS, 3.
12. S Kumar, J Kamboj, Suman, S Sharma. Overview for Various Aspects of the Health Benefits of *Piper Longum* Linn. Fruit. *Journal of Acupuncture and Meridian Studies*, 2011; 4(2): 134-140.
13. *Ayurvedic Pharmacopea of India Part, I: 1*.
14. S Imtiyaz, K Rahman, A Sultana, M Tariq, SS Chaudhary. *Zingiber officinale* Rosc.: A traditional herb with medicinal properties. TANG [HUMANITAS MEDICINE], November 2013.
15. Database on medicinal plant used in Ayurveda by CCRAS, 8.
16. [https://www.researchgate.net/publication/313742829\\_The\\_pharmacological\\_activities\\_of\\_Cuminum\\_cuminum\\_-A\\_review](https://www.researchgate.net/publication/313742829_The_pharmacological_activities_of_Cuminum_cuminum_-A_review).
17. Suresh Kumar et al./ *Journal of Pharmacy Research*, 2012; 5(1): 480-484.
18. Sveta Sharma et al. / *IJDFR*, Nov.-Dec.2011; 2(6).
19. Takooree H, Aumeeruddy MZ, Rengasamy KRR, Venugopala KN, Jeewon R, Zengin G, Mahomoodally MF. A systematic review on black pepper (*Piper nigrum* L.): from folk uses to pharmacological applications. *Crit Rev Food Sci Nutr*, 2019; 59(sup1): S210-S243. doi: 10.1080/10408398.2019.1565489. Epub 2019 Feb 11. PMID: 30740986.
20. Database on medicinal plant used in Ayurveda by CCRAS, 4: 534.
21. M Vangalapati, Sree Satya N, Surya Prakash DV, S Avanigadda. A Review on Pharmacological Activities and Clinical effects of Cinnamon Species. *RJPBCS*, 2012; 3(1): 653.
22. Prof Dr Ali Esmail Al-Snafi. A review on chemical constituents and pharmacological activities of *Coriandrum sativum*. *IOSR Journal of Pharmacy*, July 2016; 6(7): 17-42.
23. Charaka Samhita "Vidyotini" Hindi Commentary by Pt. Kashinath Shastri and Dr. Gorakhnath Shastri, Chaukhamba Bhauati Academy, Varanasi, Sutrasthana, Chapter, 1998; 13(14).
24. Sushruta Samhita "Ayurveda Tattva Sandipika" Commentary by Kaviraj Ambikadutta Shastri, Chaukhambha Sanskrit Sansthan, Varanai, Sutrasthana, 2012; 45(96).
25. <https://drjjgargor.wordpress.com/tag/chemical-composition-of-ghee-cows-ghee/>.
26. Bhavaprakash Nighantu of Shri Bhavamishra Commentary by Dr. K. C. Chuneekar, Chaukhambha Bharti Academy, Ikshuvarga, 2002; 30.
27. USDA Nutrient Database -Wikipedia, the free encyclopedia.
28. Charaka Samhita "Vidyotini" Hindi Commentary by Pt. Kashinath Shastri and Dr. Gorakhnath Shastri, Chaukhamba Bhauati Academy, Varanasi, Chikitsasthana, 1998; 27: 245.
29. Bagde A. B., Sawant R. S., Bingare S. D., Sawai R. V., Nikumbh M. B. Therapeutic and nutritional values of honey (Madhu). *Int Res J Pharm*, 2013; 4(3): 19-22.
30. S Samarghandian, T Farkhondeh, F Samini. Honey and Health: A Review of Recent Clinical Research. *Pharmacognosy Res.*, 2017 Apr-Jun; 9(2): 121-127. doi: 10.4103/0974-8490.204647.
31. [https://www.researchgate.net/publication/273003949\\_Chemistry\\_and\\_pharmacology\\_of-Withania\\_somnifera\\_An\\_update](https://www.researchgate.net/publication/273003949_Chemistry_and_pharmacology_of-Withania_somnifera_An_update).