Indian Journal of Ancient Medicine and Yoga
Volume 6 Number 3, July - September 2013

Effect of Rasayana Formulation on Physical Performance and Certain Hematological and Biochemical Parameters in Ageing Patients

Samarakoon S.M.S*, Hearapathdeniya S.K.M.K, Chandola H.M*****

Abstract

Ageing is a natural phenomenon, which had been accepted since long in Ayurveda, but being realized by modern gerontologists only since recent past. Rate of ageing is determined by one's biological, social, life style and psychological conditions and adversity of which leads to accelerated form of ageing, which is termed as *akalaja jara* in Ayurveda. The aims of the present study was to evaluate the classical formulation-*Amalakayas Rasayana* on selected subjective as well as objective parameters and to assess overall out come on quality of life in premature ageing patients. Results showed that AR improved physical capacity in premature ageing to a significant level. AR improves most of the health parameters. The improvement in walking time, hand grip power, foot pressure, short term memory, long term memory and breath-holding time and skin wrinkling time are highly significant ($p<0.001$). AR reduced mean systolic B.P (5.39%) in statistically significant manner ($p<0.01$), whereas decreased diastolic B.P (11.46%), pulse rate (14.7%), mean pressure (7.16%), and rate pressure (6.54%) in highly significant manner ($p<0.001$). Most haematological and biochemical parameters are changed with in physiological range. AR increased PCV (1.15%), hemoglobin (1.09%) and Neutrophil (5.03%) in statistically significant manner ($p<0.01$), while decreased ESR (5.61%) in significant manner ($p<0.01$). AR increases the parameters of liver function tests mentioned bellow, they were within physiological limit. The increase of total protein (3.45%), albumin (3.22%) and globulin (3.83%) is statistically highly significant ($p<0.001$), Therefore, AR is *rasayana* in the true sense and may be an effective medicine in improving physical activity in ageing patients.

Keywords: *Amalakayas rasayana;* Health parameters; Physical exertion test; Liver function test.

Introduction

Ageing is defined as a progressive and generalized impairment of functions resulting in a loss of adaptive response to stress and in a growing risk of age associated disease. It is important to distinguish normal ageing that is universal biological changes that occur with advancing age and are unaffected by disease and environmental influences, which is known as chronological ageing and according to Ayurveda *kalaja jara*. In contrast, the accelerated ageing is strongly affected by environmental, lifestyle and some disease conditions which are related to ageing but not due to ageing itself. This condition is known as *akalaja jara.[1] Rasayana* drugs may have a role in minimizing free radical induce damages in premature ageing. *Amalakayas Rasayana* is a classical formulation, and the ingredient of AR are equal amounts of fresh *Emblica officinalis* fruits, fine powder of *Emblica officinalis* Gaertn.and the ingredient *vayastapana mahakashaya[2]* i.e., *Alpenia galanga Willd.*, *Asparagus racemosus Willd.*, *Boerhavia diffusa Linn.*, *Centella asiatica* Linn. Urban., *Desmodium gangiticum* Linn. DC., *Leptadenia reticulate* Retz. Wt. & Arn., *Pluchea lanceolata* Oliver & Hiern., *Terminalia chebula* Retz., *Tinospora cordifolia* Willd., and *Lauha Bhasma* (Incinerated Iron-Fe_2o_3). The drug was prepared as per classical references.[3]

Author's Affiliation: *Head-Dept. of Ayurveda Basic Principles, Gampaha Wickramarachchi Ayurveda Institute, University of Kelaniya, Yakkala, SriLanka, **Head-Dept. of Dravyagunavignana, Institute of Indigenous Medicine, University of Colombo, Rajagiriya, ***Head-Dept. of Kayachikitsa & Ex. Dean, IPGT & RA, Gujarat Ayurveda University, Jamnagar.

Reprint's request: **Dr. S.M.S. Samarakoon,** Head-Dept. of Ayurveda Basic Principles, Gampaha Wickramarachchi Ayurveda Institute, University of Kelaniya, Yakkala, Sri Lanka.

E-mail:samarakoonsms@yahoo.com

(Received on 24.04.2013, accepted on 31.05.2013)

Aims and objectives

The study was designed to assess the efficacy of AR on various objective parameters on persons who are clinically aged than their actual age and to evaluate it therapeutically as an anti-ageing medicine.

Method of study

The study was a randomized single blind clinical research. The 51 diagnosed patients were subjected to the detailed history taking based on demographic data as well as objective parameters before the clinical trial. All the patients were subjected to routine hematological and biochemical investigations before and after treatment. The patients were prescribed *Amalakayas Rasayana*, 1 gm thrice daily for 10 weeks in empty stomach with unequal amount of honey and ghee as *vehicle*. After completion of treatment, patients were observed for 1 month and all parameters were re-assessed. Data obtained before and after treatment were analyzed by pared and un-pared students't-test by using SIGMASTAT SOFTWARE version3.5. Physical performance was assessed by using "health parameters"[4], "physical exertion test (PET)", before and after treatment. Anthropometric parameters such as height, weight, body mass index (BMI) and the ponderal index (PI)[5] were also measured in every patient.

Inclusion criteria

Patients aged between 30-60 years having signs and symptoms of premature ageing were selected irrespective their age, sex, education, socio-economic status and religion etc. Exclusion criteria: Patients below 30 and above 60 years, suffering from any chronic systemic disease such as DM, HTN, COPD and malignancies which are due to some other pathologies rather than the ageing and who are on any chronic medication were excluded from the study.

Results and Discussion

On health parameters: Walking time, handgrip power, foot pressure and breath holding time are related to body strength, on the other hand improvement of which indicates *rasayana* (rejuvenating), *balya* (promoting strength) and *vrimhana* (anabolizing) effects of AR. AR decreased skin wrinkling time indicates improved skin health, for which *rasayana* properties of AR along with *snehana* properties (unctuous) of ghee may be

Table 1: Effect of AR on health parameters of 51 premature ageing patients (Paired-t test)

Parameter	Mean		% of relief	S.D	S.E	't'	p
	BT	AT					
Walking time (s)	38.38	36.29	5.51 ↓	2.53	0.35	5.92	<0.001
Hand grip power	130.58	137.16	5.45 ↑	6.22	0.87	7.54	<0.001
Foot pressure	54.14	63.08	18.0 ↑	4.94	0.69	12.92	<0.001
Short term memory	54.71	60.39	15.9 ↑	6.71	0.94	6.05	<0.001
Long term memory	34.12	44.12	41.4 ↑	9.16	1.28	7.79	<0.001
Breath holding time	27.74	30.19	11.9 ↑	3.31	0.46	5.29	<0.001
Pulse rate	82.47	82.69	1.2 ↑	8.49	1.19	0.18	> 0.05
Systolic B.P	120.67	121.72	1.38 ↑	9.40	1.32	0.80	> 0.05
Diastolic B.P	78.82	79.57	1.36 ↑	6.89	0.96	0.77	> 0.05
Body weight	61.94	62.17	0.65 ↑	1.60	0.22	1.00	>0.05
Respiratory rate	14.57	14.22	1.74 ↓	1.11	0.15	2.27	<0.01
Body mass index	24.62	24.73	0.65 ↑	0.63	0.09	1.22	>0.05
Ponderal index	15.73	15.79	0.54 ↑	0.40	0.06	1.03	>0.05
Skin wrinkling time	5.14	4.89	3.91 ↓	0.46	0.06	3.87	<0.001

Table 2: Effect of AR on physical exertion test (PET) of 51 premature ageing patients (Paired-t test)

Parameter	Mean		% of change	SD	SE	't'	p
	BT	AT					
B.P (systolic)	15.27	14.37	5.39 ↓	2.38	0.33	2.71	<0.01
B.P (diastolic)	9.49	8.29	11.46 ↓	1.39	0.19	6.13	<0.001
Pulse rate	13.74	11.19	14.70 ↓	2.41	0.34	7.55	<0.001
Pulse pressure	6.14	6.16	5.87 ↑	2.66	0.37	0.053	>0.05
Mean pressure	12.37	11.31	7.16 ↓	1.72	0.24	4.38	<0.001
Rate pressure	0.28	0.25	6.54? ↑	0.038	0.005	6.00	<0.001

Table 3: Effect of AR on hematological parameters of premature ageing patients (Paired-t test)

Parameter	Mean		% of change	SD	SE	't'	p
	BT	AT					
Total WBC	6839	7121	5.93 ↑	1373	192	1.47	>0.05
Neutrophil	57.35	59.67	5.03 ↑	8.13	1.14	2.03	< 0.01
Lymphocyte	35.49	34.22	2.28 ↓	7.20	1.01	1.26	>0.05
Eosinophil	3.43	3.23	0.51 ↑	1.31	0.18	1.07	>0.05
Monocyte	3.27	3.12	2.61 ↓	0.81	0.11	1.38	>0.05
PCV	36.71	37.12	1.15 ↑	1.05	0.15	2.83	< 0.01
RBC	4.51	4.57	1.36 ↑	0.28	0.039	1.36	> 0.05
Hemoglobin	11.61	11.73	1.09 ↑	0.31	0.04	2.79	<0.01
ESR	24.55	21.94	5.61 ↓	8.30	1.16	2.24	<0.01

praised. These results provide concrete support that AR has potent *rasayana* effect. It enhances nourishment to the *dhatu* (essential body tissues) and promotes strength as most ingredients of AR are having *balya, vrishya* and *vrimhana* properties. These data support by the data generated in experimental study on AR revealing that both AR and *anupana* (ghee + honey) increased body weight of albino rats which indicates their positive effect on physical performance.

All the parameters of PET except pulse pressure showed significant change, meaning their differences of improvement are wider. Asparagus racemosus[6] and Tinospora cordifolia[7] are of balya; Terminalia chebula, Boerhavia diffusa and Asparagus racemosus[8] are hridya drugs (cardiotonic). Boerhavia diffusa[9] is a cardio-tonic and Emblica officinalis[10] is cardio-protective, both strengthen the heart. Leptadenia reticulate and Terminalia chebula can reduce blood pressure. Emblica officinalis and Pluchea lanceolata[11] has anabolic effect. Tinospora cordifolia, Emblica officinalis and Asparagus racemosus has adaptogenic properties. Further, AR contains 27.5% w/w iron and it has increased hemoglobin (1.09%) significantly. These may be the reasons to show significant results on physical exertion test. Moreover, *rasayana* and *balya* properties of AR enhance nutrition of *dhatu* by which fatigue and weakness relieve. Collectively ghee and honey pacify *tridosha* (the three basic humors), increase digestion (*agni*) and provide many essential nutrients to the body. Ghee enhances absorption of fat soluble vitamins and provides essential fatty acids which are not available in vegetarian diet. Both ghee and honey possess *rasayana[12,13]* and *balya* properties. Ghee is said to have "*sahasra-virya[14]*" and "*sahasra-karma*" meaning ghee is strong enough to alleviate many disease and possesses innumerable pharmacodynamic activities. Ghee and honey by its *samskaranuvartana[15]* and *yogavahi* nature further potentiate the effect of AR. The synergistic and cumulative effect of both drug and vehicle promote nutrition to *sapta dhatu* and simultaneously pacify vitiated *vata* to normalcy. This gradual transformation of *dhatu* enhanced by AR may be the cause of improving physical strength significantly. The sole objective of *rasayana* drugs is to ensure

Table 4: Effect of AR on liver function tests of 51 premature ageing patients (Paired-t test)

Parameter	Mean		% of change	SD	SE	't'	p
	BT	AT					
T. cholesterol	177.92	184.57	4.88 ↑	27.67	3.87	1.72	> 0.05
Triglyceride	153.33	155.31	14.81 ↑	81.91	11.47	0.17	> 0.05
HDL	41.18	41.86	3.78 ↑	8.16	1.14	0.60	> 0.05
SGPT	31.157	21.941	8.6 ↑	65.14	9.122	1.01	> 0.05
SGOT	34.59	27.41	3.5 ↑	55.83	7.82	0.92	> 0.05
T. protein	7.03	7.27	3.45 ↑	0.48	0.067	3.46	< 0.001
Albumin	3.92	4.04	3.22 ↑	0.27	0.038	3.15	< 0.001
Globulin	3.12	3.23	3.83 ↑	0.30	0.043	2.67	< 0.001
Al. phosphatase	55.59	58.76	10.76 ↑	16.78	2.35	1.35	> 0.05
T. bilirubin	0.68	0.69	2.8 ↑	0.17	0.024	0.32	> 0.05

proper nutrition of *dhutu*. When *dhatu* absorb proper nutrition, they start to rejuvenate and gradually reverse the degenerative process that has been happening in premature ageing. AR by its pharmacodynamic properties acts on *dosha,dhatu, srotas* (micro and macro channels in the body) and *agni* to correct their anomalies by which signs and symptoms related to *dhatu kshaya* are subsided.

On hematological parameters, It means AR has effect on erythropoiesis. AR contain Fe_2O_3 27.5%w/w (*lauha bhasma*), which can increase hemoglobin in blood. *Lauha* is *rasayana* which acts on *rakta* and *majja dhatu* and *amalaki* also acts on *rakta dhatu*. Tinospora cordifolia[16] is one among best *rakta-shodhaka* drugs. Honey contains iron (0.42 mg/100g or 3%) & vitamin C (0.5 mg/100 g or1%) and increase bone marrow functions.[17] Therefore, these results suggest that AR competent to increase blood hemoglobin and hemopoiesis. Collectively, *rasayana* properties of AR are accountable for the increment of these blood indices.

Based on results obtained on liver function tests it is suggested that AR increases total cholesterol, total protein, albumin, globulin, alkaline phosphatase and serum bilirubin. But these values are within normal range, whereas it decreases HDL, SGOT and SGPT which may be due to liver protective effect of AR. These result supports by another study that an *amalaki* contained drug has reduced SGOP, SGPT and Alkaline phosphatase in experimental animals.[18] AR on Charles Foster albino rats has shown similar results by increasing Hb%, WBC, eosinophil and neutrophil count and decreasing lymphocyte & monocyte count.

AR contains *lauha bhasma* (27.50%w/w) which possesses *raktajanana, vrishya* and *rasayana* properties. *Lauha* is said to act on *rakta* (blood) and *majja dhatu* (bone marrow)[19] AR also contains Emblica officinalis which is a richest source of Emblicin -A & B[20] that has similar functions of ascorbic acid which enhances iron absorption. Emblica officinalis is also said to act on *rakta dhatu*.[21] This is the cause for AR to have significant effect on *rakta* and *majja dhatu*. AR showed moderate improvement in 5.9% patients and mild improvement in 45.09% patients. In an experimental study Tinospora cordifolia and Centella asiatica are proved to have adaptogenic activity[22] and to improve anxiety and relieve mental fatigue.[23] Asparagus racemosus has been proven for its anti-stress activity.[24] Some other drugs in AR are also having *medhya* (memory boosting) properties. Therefore it is evident that being a formulation of above well-known *medhya* and *rasayana* drugs, AR has efficacy to correct stress and anxiety level to achieve healthy mental state too.

Conclusion

Premature ageing is accelerated version of ageing, which create untimely symptoms of ageing and age related diseases depending

upon its rate determining by various factors. The main objective of *rasayana* is to improve nutritional state of body by which healthy youthfulness and longevity is expected. For this purpose a numerous formulations are being used from immemorial past. *Amalakayas rasayana* was selected for the clinical study of premature ageing. All most all the ingredients in AR has antioxidants, free radical scavenging activity, adaptgenic activity, immune modulatory activity and enhance production of endogenous antioxidant enzymes. Keeping all these facts in view, it can be concluded that observed result in subjective as well as objective parameters are due to anti ageing and multi-dimensional effect of *Amalakayas Rasayana* and it is a effective potential medicine in enhancing physical performance and improving hematological and biochemical parameters in accelerated ageing.

References

1. Yadavji Trikamji Acharya. Sushruta Samhita of Sushruta. Varanasi: Chaukambha Surabharati Prakashan; 2008, Su. Su. 24/7, 114.
2. Ibid. 34; Ch.Su.4/50, 34.
3. Yadavji Trikamji Acharya (ed). Charaka Samhita (reprint edition). Varanasi: Chaukambha Prakashan; 2009, Ch.Su.4/18, 34; Ch.Ch.1.3/1-6, 383-384.
4. Kunt CU. Studies on Kutipraveshika and Vatatapika rasayana effect of varahikanda in promotion of health and management of ageing (PhD thesis). Gujarat Ayurveda University, Jamnagar: 2004; 142.
5. Wikepedia, the free encyclopedia accessed on 26 jun, 2009. Michael Swash, Michael Glynn: Hutchison's Clinical methods 22nd edition. London: Saunders; 2007, 45-46.
6. Yadavji Trikamji Acharya. Charaka Samhita. Varanasi: Chaukambha Prakasha; 2009, Ch.Su. 4/7, 34.
7. Bhavaprakasha of Bhavamishra. Edited by Bhrahmasankara Mishra and Rupalalaji Vaishya. Varanasi: Chaukambha Sanskrit Bhavan; 2007, BPN.GV/8-10.
8. Yadavji Trikamji Acharya (ed). Charaka Samhita (reprint edition). Varanasi: Chaukambha Prakashan; 2009, Ch.Su.4/7, 34.
9. Sukh Dev. A Selection of Prime Ayurvedic Plant Drugs. New Delhi: Anamaya Publishers; 2006, 109.
10. Ibid, 229.
11. Ibid, 68-69.
12. Yadavji Trikamji Acharya. Sushruta Samhita. Varanasi: Chaukambha Surabharati Prakashan; 2008, Su.Su.5/37-39, 44-45.
13. Bhavaprakasha of Bhavamishra. Edited by Bhrahmasankara Mishra and Rupalalaji Vaishya. Varanasi: Chaukambha Sanskrit Bhavan; 2007, BPN.MV/51-52, 46-47.
14. Yadavji Trikamji acharya (ed) 2009; Charaka Samhita (reprint edition), Chaukambha prakashan,Varanasi, Ch.Ni.1/38-39, p. 203; Ch.Su.13/14, p. 23,24; AH.Su.5/37-39, p.44,45
15. Yadavji Trikamji Acharya (ed). Charaka Samhita (reprint edition). Varanasi: Chaukambha Prakashan; 2009, Ch.Su.13/13, 23-24; Ch.Ni.1/40, 203.
16. Yadavji Trikamji Acharya (ed). Charaka Samhita (reprint edition). Varanasi: Chaukambha Prakashan; 2009, Ch.Su.25/40, 131.
17. Gheldof N, Wang X, Engeseth N. Identification and quantification of antioxidant components of honey from various floral sources. *J Agric Food Chem.* 2002; 50(21): 5870-7. PMDI 12358452,315.
18. Girish S Achliya, Sudhir G, Wadodkar, Avinash K.Dorle. Evaluation of hepatoprotective effect of Amalakadi Ghrita against carbon tetrachloride induced hepatic damage in rats. *Journal of Ethnopharmacology.* 2004; 90: 229-232.
19. Singh RH. The Holistic Principles of Ayurvedic Medicine. Delhi: Chaukambha Samnkrit Pratishthan; 1998, 210.
20. Sairam M, *et al. Phytother Res.* 2003; 17:430. Khandelwal S, Shukla IJ, Shanker R. *India J Exp Boil.* 2002; 40: 564.
21. Singh RH. The Holistic Principles of Ayurvedic Medicine. Delhi: Chaukambha Samnkrit Pratishthan; 1998, 210.
22. Urmila M Thatte, Nirmala N *et al.* Addaptogenic properties of six Rasayana herbs used in Ayurvedic Medicine. *Phytotherapy*

Research. 1999; 13: 275-291.

23. (a) Gupta YK, *et al.* Effect of Centella asiatica on pentylenetetrazole-induced kindling, cognition, and oxidative stress in rats. *Pharmacology Biochemistry and Behaviour.* 2003; 74(3): 579-585.

    (b). Sharma Ajay K, Sharma CV, Sharma UK. Clinical Evaluation of Medhya rasayana effect of Mandukaparni-A Scientific study. *Journal of Research in Ayurveda and Siddha.* 2005; XXVI(1-2): 32-44.

24. Urmila M Thatte, Nirmala N *et al.* Addaptogenic properties of six Rasayana herbs used in Ayurvedic Medicine. *Phytotherapy Research.* 1999; 13: 275-291.