INTERNATIONAL
AYURVEDIC
MEDICAL JOURNAL

IAMJ

Research Article ISSN: 2320 5091 Impact Factor: 4.018

SINGLE BLIND RANDOMIZED CONTROLLED CLINICAL STUDY TO EVALUATE THE EFFICACY AND SAFETY OF *SHIVAGUTIKA* IN DYSLIPIDEMIA

Gajanana Hegde[1], Sanjay Kumar M.D.[2], Caroline Theresa Cutinha[3]

[1]Principal, [2]Associate professor, Dept. of PG studies in Kayachikitsa, [3]Assistant Professor, Dept of Shalya Tantra; Government Ayurveda Medical College, Mysuru, Karnataka, India

Email: dr.hegdegajanana@gmail.com

ABSTRACT

Objective: To evaluate the effect and safety of trial drug *Shivagutika* on Lipid profile and Apolipoprotein B in dyslipidemia and comparison with control drug *Navaka Guggulu*. **Study Design:** Randomized, single blind controlled clinical study of 45 days duration with pre and post test assessment. 60 patients diagnosed with dyslipidemia were randomly selected and assigned into two groups, Group A (Control) and Group B (Test), each group consisting minimum of 30 patients. Group A patients received *Navaka Guggulu* and Group B patients received *Shiva Gutika* for 45 days. Blood samples of both the groups for Lipid profile, Apolipoprotein B and Safety Assessment were evaluated before starting the treatment (0^{th} day) and after the completion of the treatment (46^{th} day). **Results:** Both Group A & Group B drugs showed significant result in reducing Lipid Profile & Apolipoprotein B in Dyslipidemia. *Shivagutika* had edge over *Navaka guggulu* in reducing the components of Lipid profile like S. Triglycerides, LDL, HDL, VLDL, Total Cholesterol and Cholesterol/HDL ratio. On Apolipoprotein B *Navaka Guggulu* showed better results than *Shivagutika.* **Interpretation & Conclusion:** The result obtained in this study support the hypothesis i.e trial drug is better than control drug. Hence in this study design *Shivagutika* when compared to *Navaka guggulu* has shown a better result for Dyslipidemia. The safety assessment of drugs both clinically & statistically shows a significant result, which implies that the drug of trial & control group are safe in this study design for the said interval, for the said duration & for the said dosage.

Keywords: *Shiva Gutika, Navaka Guggulu*, Dyslipidemia

INTRODUCTION

Hyperlipidemia, hyperlipoproteinemia or dyslipidemia is the condition of abnormally elevated level of any or all lipids and /or lipoproteins in the blood[1]. Epidemiological studies have established a strong correlation between premature coronary artery disease (CAD) and cardiovascular disease (CVD) and serum cholesterol levels. World Health Organization (WHO) in 2002 reported that high cholesterol level is one of the main non-communicable disease-related risk factors in India[2].

Conventional treatment principles for hypercholesterolemia aim to reduce cholesterol biosynthesis, which will lead to lower blood levels. Most of the drugs (statins) available today are inhibitors of 3-

hydroxy-3-methylgluatarylcoenzyme A reductase, which is involved in cholesterol biosynthesis in the liver. Literature shows that the use of statins has a risk of chronic toxic effects including carcinogenic, teratogenic, and mutagenic changes over a lifetime of use[3]. Other drug therapy includes resins, niacin and fibrates which give rapid relief but long term side effects such as hepatic or renal impairment, malaise, hyperglycemia, constipation, flatulence, nausea, diarrhea, gallstones, myositis and liver enzyme elevation. Most of these lipid lowering drugs are contraindicated in patients with Chronic liver disease, severe renal failure, gout and gall bladder disease[4]. Hence there is a need for more natural methods to control cholesterol levels. *Ayurveda* emphasizes various dietic regimens, *panchakarma* procedures, wide range of herbal and mineral drugs in the management of *medoroga*, which are *kaphamedohara, sthoulyahara* and *hrudya* either individually or in combination. During past few decades there has been extensive research carried out in this regard and effective treatment modalities have been found. But these treatment modalities mainly include *snehapana, vamana, virechana* which are inpatient oriented, time consuming and costly.

Shivagutika is one of the herbomineral drugs contexted in various *ayurvedic* classics for the treatment of *kaphamedoja vikara* like *prameha, medoroga, sthoulya, granthi, gulma, arbudha*. The main ingredient of *Shivagutika* is *shilajatu* along with, *karkata shungi, trikatu, chaturjataka, gomutra* and honey[5].

Shilajatu possesses *rasayana* (rejuvenation), *vrishya* properties (aphrodisiac). It is useful in the treatment of *prameha* (diabetis mellitus), *pandu* (anemia), *gulma* (tumor), *pleeharoga* (splenic disordes), *sthaulya* (obesity), *shotha* (swelling), *jvara* (fever), HIV etc.[6] It has significant anti-inflammatory, analgesic, immunomodulatory, antiviral and antioxidant activity. Experimental studies on lipid profile of hyperlipidemic albino rats, *shiljatu* has proven a significant effect against simvastatin[7]. The above mentioned trial gives a potential proof to conduct human clinical trials. Hence an attempt was made to find a safe, cost-effective and a promising remedy against dyslipidemia.

MATERIALS AND METHODS

Drug Source

Shiva Gutika and *Navaka Guggulu* were purchased from GMP certified SDM Ayurveda Pharmacy, LN nagar, Kuthpady, Udupi, Karnataka which were prepared as per the literature reference.

Sample Source

60 patients diagnosed with Dyslipidemia were taken for the study from the OPD and IPD of the Government Ayurveda Medical College and Hospital, Mysore and from the special camps conducted for the study.

Method of collection of data

60 patients fulfilling the inclusion criteria of either sex were randomly selected. They were assigned into two groups A & B of 30 patients each.

a) Diagnostic criteria

Patients were diagnosed on the basis of the lipid profile, showing any one or more of the following criteria.

- Serum cholesterol >200 mg/dl
- Serum Triglycerides >150 mg/dl
- Serum LDL >130 mg/dl
- Serum VLDL >40 mg/dl
- Serum HDL <40 for male <30 for female
- Ratio of HDL to Cholesterol >4.5
- Apolipoprotien B >125mg/dl

b) Inclusion Criteria

- Men and women age more than 20 years and below 60 years.
- Patients fulfilling the diagnostic criteria.
- Both fresh and treated cases were included (Flush out period of 7 days was maintained for treated cases).

c) Exclusion criteria

- Patients having history of serious cardiac disorders like myocardial infarction, cardiac failure, etc.
- Patients having any major illness, insulin dependent diabetes mellitus, Type II diabetes mellitus that is poorly controlled
- Patients having a history of untreated thyroid disorder
- Hyperlipidemia due to drugs (e.g., glucocorticoids)
- Pregnant females and lactating mothers
- Renal insufficiency

d) Subject withdrawal criteria

- Occurrence of a serious adverse event
- Subject had an acute reaction (allergy, shock and so on) to the investigational product
- Detection of a systemic disease that was not discovered at the screening stage
- Unable to progress because of worsening of preexisting disease
- Subject's withdrawal of consent
- Subject is uncooperative
- Investigator's decision to terminate the process for the sake of the subject's health

e) Investigations:

Specific investigation –

- Serum Lipid Profile (12 hr fasting blood sample), Apolipoprotien B was investigated as a biomarker for hyperlipidemia.
- Other Blood investigations – Hb %, TC, DC, ESR, RBS to rule out other diseases.
- Blood Urea, Serum Creatinine, Liver function test for safety assessment.
- Urine investigations - Urine Sugar, microscopic, albumin were done to rule out other systemic diseases or complications.

f) Intervention (Drugs and posology)

The selected patients were randomly allocated into two groups as follows:

	GROUP A	GROUP B
Drug	Tab *Navaka guggulu*	Tab *Shivagutika*
Dose	2gram per day in two equally divided doses.	2gram per day in two equally divided doses.
Duration	45 days	45 Days
Anupana	Water	Water
Route / Mode	Oral	Oral
Kala (Timings)	Morning and night- after meals	Morning and night- after meals

g) Assessment parameter

- Assessment was done by post test Lipid profile and Apolipoprotien B measurement.
- The assessment was done before starting the treatment i.e. 0^{th} day and after the completion of the treatment i.e. 46^{th} day.

h) Assessment of safety

- Liver function test, serum Creatinine and blood urea were done before and after intervention.

Statistical Method

The data was collected before & after intervention and assessed statistically by using descriptive statistics, paired sample 't' test. Analysis was done by using Service product for statistical solution (SPSS) for windows software.

OBSERVATION

Among the 60 patients registered in the study, the incidence of Dyslipedemia was more in the age group of 51-60 yrs (48.33%), 53.33 % patients had no comorbidity of other diseases, 16.66% patients had a history of diabetes mellitus and 16.66% patients had a history of Hypertension, 10% patients had a history of both diabetes mellitus and hypertension. 76.66% patients were fresh cases and 23.33 % were treated cases. 23.33% patients had a family

history of dyslipidemia and 76.66% had no family history of dyslipidemia. 73.33% patients had mixed diet habit and 26.66 % patients were vegetarians. 26.66% patients had a habit of daily walking and 65% patients were not following any Exercise Pattern. Maximum number of patients had over weight (46.66%), while 33.33% been obese, 20% had normal BMI and no one was under weight or morbidly obese.

RESULTS:

Effect on Lipid Profile & Apolipoprotein B

1. S. Triglycerides: There is significant change in mean value for group A from 242.3 to 219.3 & for group B 299.7 to 218.8. If we analyze the mean value, Group B is far better than group A.
2. S. LDL: There is significant change in mean value for group A from 116.4 to 112.4 & for group B 122.6 to 117.3. If we analyze the mean value, Group B is far better than group A.
3. S. HDL: There is significant change in mean value for group A from 45.73 to 45.70 & for group B 46.78 to 45.70. If we analyze the mean value, Group B is far better than group A.
4. S. VLDL: There is significant change in mean value for group A from 48.44 to 43.87 & for group B 59.95 to 43.77. If we analyze the mean value, Group B is far better than group A.
5. Total Cholesterol: There is significant change in mean value for group A from 206.53 to 204.84 & for group B 212.6 to 203.9. If we analyze the mean value, Group B is far better than group A.
6. T.Chol/HDL ratio: There is significant change in mean value for group A from 4.50 to 4.48 & for group B 4.54 to 4.49. If we analyze the mean value, Group A and group B drugs have similar effect on T.Chol/HDL ratio, with slightly better results in Group B.
7. Apolipoprotein –B: There is significant change in mean value for group A from 119.9 to 118.3 & for group B 116.73 to 116.8. If we analyze the mean value, Group A is better than group B.

Safety Assessment:

1. Blood Urea: In group A mean value changed from 21.86 to 21.70 & in group B from 21.7 to 21.8. If we analyze the mean value, both the drugs are safe for the said dosage, duration & intervention. Statistically the slight increase of Blood urea mean value I Group B implies that the drug of group A is less toxic than drug of Group B.
2. S. Creatinine: In group A mean value changed from 0.89 to 0.90 & in group B from 0.88 to 0.93. If we analyze the mean value, both the drugs are safe for the said dosage, duration & intervention. Mean values also interpret that both the drugs of group A & group B in a longer duration may give some toxic effects, so it is safer for the interventional duration beyond that cautious approach can be adopted.
3. Total Bilirubin: In group A mean value changed from 0.65 to 0.62 & in group B from 0.63 to 0.66. If we analyze the mean value, both the drugs are safe for the said dosage, duration & intervention. Statistically the increase of Bilirubin mean value in Group B implies that the drug of group A is less toxic than drug of Group B.
4. SGOT: In group A mean value changed from 26.46 to 25.63 & in group B from 28.9 to 26.2. If we analyze the mean value, both the drugs are safe for the said dosage, duration & intervention.
5. SGPT: In group A mean value changed from 29.26 to 27.55 & in group B from 31.76 to 30.63. If we analyze the mean value, both the drugs are safe for the said dosage, duration & intervention.
6. GGT: In group A mean value changed from 29.2 to 28.6 & in group B from 29.80 to 39.56. If we analyze the mean value, both the drugs are safe for the said dosage, duration & intervention. Statistically the increase of GGT mean value in Group B implies that the drug of group A is less toxic than drug of Group B.

7. S. Alk. Phoapate: In group A mean value changed from 70.66 to 73.66 & in group B from 70.86 to 71.60. If we analyze the mean value, both the drugs are safe for the said dosage, duration & intervention. Mean values also interpret that both the drugs of group A & group B in a longer duration may give some toxic effects, so it is safer for the interventional duration beyond that cautious approach can be adopted.
8. Serum Total Protein: In group A mean value changed from 7.003 to 7.039 & in group B from 7.21 to 6.97. If we analyze the mean value, both the drugs are safe for the said dosage, duration & intervention.

DISCUSSION

Discussion on diseases Dyslipidemia:

There is no precise term for dyslipidemia in the *Ayurvedic* classics. Literature shows that scholars have tried to use distinct nomenclature for dyslipidemia, e.g., *Rasagata Sneha Vriddhi* (increase in lipids in plasma), *Rasa Raktagata Sneha Vriddhi* (increase in the lipids in plasma and blood), *Medovriddhi* (generalized lipid increase), *Medoroga* or *Medodosha* (obesity), *AAMA Medodhatu* (abnormally formed adipose tissue). A detailed study of hyperlipidemia with regard to the pathophysiology reveals its similarity to *Asthayi Medo Dhatu Vriddhi* (abnormal increase in circulating lipids). This excessively increased circulating lipid is *AAMA* in nature is also termed as *bahuabadha medas* in the context of *prameha*[8].

Recent research on Dyslipidemia carried out at I.P.G.T and R.A, Jamnagar by Shivam et.al concluded that Dyslipidemia is *Aama, Kapha, Kleda* and *Avaranaajanya* disease. The researches on dyslipidemia suggest that, *Laghu, Ruksha*, and *Kashaya Rasa* dominant formulation is more effective against serum cholesterol and S.LDL, while *Laghu, Ushna*, and *Katu Rasa* dominant formulation is effective in condition of hypertriglyceridemia[9].

Achieving *Dhatusamyata* is the main aim of treatment in *Ayurveda*. So the treatment of dyslipidemia should be also planned for achieving *Dhatusamya*. *Nidana* of Dyslipidemia vitiates *Jatharagni, Rasa Dhatvagni, Mamsa Dhatvagni, Meda Dhatvagni* and increase *Ama, Kapha, Kleda, Apakva Rasa, Abaddha Meda* and *Mamsa* in the body. Hence, the first aim of the treatment is to correct *Jatharagni, Rasa Dhatvagni, Mamsa* and *Meda Dhatvagni,* and then to remove excessive *Ama, Kapha, Kleda, Meda* and *Apakva Rasa* from the body. It is also necessary to restore the normal function of above mentioned *Agni, Dosha,* and *Dhatu* for constant normal function.

Discussion on *Shivagutika*:

1. *Shivagutika* is indicated in *Swasa, Kasa, Prameha, Shotha, Granthi, Slipada* etc[10] all most all these disorders have the involvement of the *Kapha Dosha* as a major *Samprapti Ghataka*. *Shivagutika* has *Katu Tikta Rasa, Laghu Ruksha Guna, Anushna Veerya* and *Katu Vipaka.* Dyslipidemia is mainly due to vitiation of *doshas* like *Kledaka Kapha, Samana Vata* and *Pachaka Pitta* and *dooshyas* like *Rasa* and *Medo dhatu. Shivagutika* being majorly *Kapha Vatahara* will helpful in the *Samprapti Vighatana* of the disease Dyslipidemia.

2. In *Shivaghutika, Shilajitu* is the main ingredient which possesses *Tikta, Katurasa, Kashaya Anurasa, Saraguna, Katu Vipaka, Ushna Veerya, Shoshaka, Chedana, Lekhana* and *rasayana* properties and acts as *medohara* and *stoolahara*[11]. These properties will be helpful to pacify the *pradhana dhosha Kapha* and *Dushyas* like *Meda* and *Rasa*. *Shilajatu* is also used as *yogavaha* as it increases efficacy of many drugs. Apart from this the other drugs in *shivagutika* have *kaphavata shamaka property.*

3. The Principle of management of *Avarana* is *Shodhana* treatment and the use of *Naimittika Rasayanas* like *Shilajitu* and *Guggulu.*[12] Dyslipidemia will be having *Avaranajanya Samprapti*. *Shivagutika* is also *Naimittika Rasayana* with *Shilajitu* as main ingredient, and hence helpful

in the removal of *Kapha Avarana* to *Vata* and to pacify *Meda* and *Kleda.*

Discussion on *Navaka Guggulu*:

1. *Navaka Guggulu* has *Katu-Kashaya Rasa, Laghu-Ruksha-Tikshna Guna, Ushna Virya* and *Kapha Vata Shamaka* properties which will have opposite action on *Kapha Dosha* as well as *Meda Dhatu*[13].

2. All the contents of *Navaka Guggulu* have *Deepana* property. Majority of the drugs have *Pachana* and *Yakriduttejaka* property. Most of the drugs possess the property of *Ushna Virya* and are being able to improve *Medodhatvagnimandhya.* In this *Yoga, Sunthi* is the best *Amapachaka* [14] which improves the *Medodhatvagni* by removing the *Aama.*

3. In Dyslipidemia, there is *Sanga* type of *Srotodushti,* produced by vitiated *Kapha* and *Meda*. *Sunthi, Maricha* and *Haritaki* possess the *Srotoshodhana* property which helps to clear the *Sroto Sanga* and regulate the function of *Medovaha Srotas*.

CONCLUSION

Effect on Lipid profile & Apolipoprotein B:

The overall outcome analysis shows both clinically & statistically the trial drug is better than the control drug on lipid profile & Apolipoprotein B in dyslipidemia. If we analyze component vise lipid profile analysis, both the drugs are benefited in lowering dyslipidemia but few components are better in control drug and few components are better in trial drug.

Shivagutika has showed comparatively greater results in lowering S. Triglycerides, LDL, HDL, VLDL, Total Cholesterol & Cholesterol/HDL ratio in comparison with *Navaka Guggulu*. On Apolipoprotein B *Navaka Guggulu* showed better results than *Shivagutika* in reducing the values.

The results obtained in this study supports the hypothesis i.e. trial drug is better than control drug. Hence *shivagutika* when compared to *navaka guggulu* has shown better result for dyslipidemia in this study design.

Safety Assessment:

The overall safety profile shows both the drugs are safer on long term use with more than 90% of normal values before & after intervention for LFT & RFT.

So the safety assessment both clinically & statistically shows a significant result, which implies that the drug of trial & control group are safe in this design study for the said interval, for the said duration & for the said dosage.

REFERENCES

1. Ketharaju v ramasubba rao, M. Laxmu Naidu. Management of hyperlipidemia (medo roda) in ayurveda-A review. International Research Journal of Pharmacy. 2011, 2(11), 6-10.
2. Yash Pal Munjal. Published by The association of Physicians of India, Mumbai, Disorders of metabolism. API Text book of Medicine (1969), 8,2., 16th Chapter, Volume-2, pg- 1232.
3. Indrayan A. Forecasting vascular disease cases and associated mortality in India. Reports of the National Commission on Macroeconomics and Health. Ministry of Health and Family Welfare, India 2005. Available at: http://www.whoindia.org/EN/Section102/Section201_888.htm. Accessed Feb 2, 2015.
4. J. I. Cleeman, Executive summary of the third report of the National Cholesterol Education Program (NCEP) 2001 expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel III). The Journal of the American Medical Association. 2001, vol. 285, no. 19, pg-2486–2497.
5. Shivagutika J.P. Tripathi, editor, Chakradatta with Bhavartha Sandipani Commentary of Chakrapanidatta.Varanasi: Chaukhambha Sanskrit Series.2003, pg- 218
6. Acharya SB, Frotan MH, Goel RK, Tripathi SK, Das PK. Pharmacological actions of Shilajit.Indian Journal of Experimental Biology. 1988;26: 775–777
7. Mudassara saqib, Samina Kausar, shahnaz akhtar. effect of shilajit on lipid profile of hyperlipidemic al-

bino rats and comparison with simvastatin. 2012 pjmhs
8. Agnivesha, Charaka Samhita with Ayurveda Dipika Commentary edited by vaidya Harish Chandra Singh kushwaha Chaukambha Orientalia, Varana-si.2010 Reprint, Charaka Sutra 219 pg- 310.
9. Hari Sharma, Xlaoying Zhang, Chandradhar Dwivedi. The effect of *Ghee* on Serum lipid levels and microsomal lipid peroxidase. Ayu. 2010 Apr-jun; 134-140. Dol. 10.4103/0974-8520, 72361 PMCID: PMC3215354.
10. Madham Shetty Suresh Babu. Yogaratnakara Ayurvedic formulations practices and procedures, ed 9th.Varanasi: Chaukhambha orientalia; 2005.Vol1.pg-459
11. Acharya JT, editor, (1st Ed.). Commentary Nibandasangraha of Dalhana on Sushruta Samhita of Sushruta, Chikitsasthana; Madhumeha Chikitsa: Chapter 13, verse 8. Varanasi: Chaukhambha Sanskrit Samsthana, 2010; 456.
12. Acharya JT, editor, (1st ed.). Commentarary Ayurved Dipika of Chakrapanidatta on Charaka Samhita of Agnivesa, Chikitsa Sthana; Vatavyadhi Chikitsa: Chapter 28, Verse 242. Varanasi: Chowkhambha Prakashana, 2011; 627.
13. Agnivesha, Charaka Samhita with Ayurveda Dipika Commentary edited by Vaidya Harish Chandra Singh Kushwaha Chaukambha Orientalia, Varanasi. 2010 Reprint, Charaka Sutra Su.26/42
14. P.V. Sharma, Dravyaguna Vijnana, volume 2, reprint: 2005, Chaukambha Bharati Academy, Varanasi.

Source of Support: RGUHS Bangalore (Extra Mural Research Grants)
Conflict Of Interest: None Declared

How to cite this URL: Gajanana Hegde et al: Single Blind Randomized Controlled Clinical Study To Evaluate The Efficacy And Safety Of Shivagutika In Dyslipidemia. International Ayurvedic Medical Journal {online} 2018 {cited June, 2018} Available from: http://www.iamj.in/posts/images/upload/1256_1263.pdf

	BEFORE TREATMENT						AFTER TREAMENT					
		groups	N	Mean	Std. Deviation	Std. Error Mean		groups	N	Mean	Std. Deviation	Std. Error Mean
Effect on Lipid Profile & Apolipoprotein B	TGL_BT	Group A	30	242.3967	125.3087	22.87813	TGL_AT	Group A	30	219.38	115.1523	3.83841
		Group B	30	299.7533	160.2794	29.26288		Group B	30	218.833	78.36303	2.612101
	LDL_BT	Group A	30	116.4267	12.9926	2.37211	LDL_ AT	Group A	30	112.4167	15.23216	0.507739
		Group B	30	122.6	12.77357	2.33212		Group B	30	117.3967	11.3896	0.379653
	HDL_BT	Group A	30	45.7333	5.77583	1.05452	HDL_ AT	Group A	30	45.7	5.44806	0.181602
		Group B	30	46.7833	5.82646	1.06376		Group B	30	45.4467	5.03544	0.167848
	VLDL_BT	Group A	30	48.44	25.02422	4.56878	VLDL_ AT	Group A	30	43.8787	23.02871	0.767624
		Group B	30	59.9513	32.05582	5.85256		Group B	30	43.772	15.66574	0.522191
	TCL_BT	Group A	30	206.5367	45.53558	8.31362	TCL_ AT	Group A	30	204.8433	36.98693	1.232898
		Group B	30	212.6	29.53268	5.39191		Group B	30	203.9	28.98079	0.966026
Safety Assesment	tcl_hdl_BT	Group A	30	4.5067	0.73482	0.13416	tcl_hdl_ AT	Group A	30	4.4833	0.6103	0.020343
		Group B	30	4.5467	0.58706	0.10718		Group B	30	4.4967	0.47957	0.015986
	apolipo_ BT	Group A	30	119.9333	26.17439	4.77877	apolipo_ AT	Group A	30	118.3	21.82872	0.727624
		Group B	30	116.7333	17.39983	3.17676		Group B	30	116.8	18.78811	0.62627
	bloodurea_ BT	Group A	30	21.8667	6.06706	1.10769	bloodurea_ AT	Group A	30	21.7033	5.36132	0.178711
		Group B	30	21.7	4.6249	0.84439		Group B	30	21.8	5.14882	0.171627
	screat_BT	Group A	30	0.8967	0.18111	0.03307	screat_ AT	Group A	30	0.9073	0.15445	0.005148
		Group B	30	0.8887	0.15527	0.02835		Group B	30	0.938	0.24654	0.008218

		Group A	30	0.659	0.20365	0.03718		Group A	30	0.6297	0.2021	0.006737
	tbil_BT	Group B	30	0.6393	0.29476	0.05382	tbil_ AT	Group B	30	0.668	0.26308	0.008769
		Group A	30	26.4667	11.53326	2.10568		Group A	30	25.6367	8.155507	0.27185
	sgot_BT	Group B	30	28.9	11.53809	2.10656	sgot_ AT	Group B	30	26.2667	7.58371	0.25279
		Group A	30	29.2667	13.75884	2.51201		Group A	30	27.5533	10.43993	0.347998
	sgpt_BT	Group B	30	31.7667	17.89564	3.26728	sgpt_ AT	Group B	30	30.6333	12.31059	0.410353
		Group A	30	29.2	17.30537	3.15951		Group A	30	28.6	14.91262	0.497087
	ggt_BT	Group B	30	29.8	17.14924	3.13101	ggt_ AT	Group B	30	39.5667	39.95465	1.331822
		Group A	30	70.6667	19.1155	3.49		Group A	30	73.667	23.48636	0.782879
	sap_BT	Group B	30	70.8667	16.00374	2.92187	sap_ AT	Group B	30	71.6	21.24991	0.70833
		Group A	30	7.0037	0.51594	0.0942		Group A	30	7.0397	0.52918	0.017639
	STP_BT	Group B	30	7.21	0.48661	0.08884	STP_ AT	Group B	30	6.9767	0.46807	0.015602