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HYPOLIPIDEMIC EFFECT OF *MOMORDICA CHARANTIA* (KARELA) AND *TERMINALIA ARJUNA* (ARJUNA): AN IN-VITRO STUDY

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ABSTRACT

Introduction: Increased levels of total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG), as well as decreasing levels of high-density lipoprotein cholesterol (HDL-C), are all signs of the chronic metabolic illness dyslipidemia. The bioactive components from herbal medicines have been shown to be efficient and safe to enhance the lipid profile in a number of rigorous clinical trials. The present study was undertaken to evaluate and compare cholesterol lowering effects of Terminalia arjuna bark and *Momordica charantia* (Karela) fruit extract on discarded pooled serum samples to check their effect on hyperlipidemia.

KEYWORDS: Cholesterol, Karela, Arjuna, hypolipidemia.

INTRODUCTION

Increased levels of total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG), as well as decreasing levels of high-density lipoprotein cholesterol (HDL-C), are all signs of the chronic metabolic illness dyslipidemia.[1] Dyslipidemia can cause cumulative cardiovascular damage if not adequately addressed.[2] According to the World Health Organization, elevated plasma cholesterol levels have a negative impact on 40% of the world's population's health.[3] Only 31% of Asians with extremely high risk had reached the fewer than 70 mg/dL limit recommended by evidence-based recommendations.[4]

A modest rise in the frequency of muscular soreness, weakness, and sadness has been linked to statin, the first-line pharmacological therapy. Additionally, in individuals 70 years of age or older, it did not lower the risk for atherosclerotic cardiovascular events. More effort is required to give every patient access to the success of therapeutic intervention since many individuals are still unable to achieve remission. The use of herbal therapy as an alternative to conventional treatment is widespread. The bioactive components from herbal medicines have been shown to be efficient and safe to enhance the lipid profile in a number of rigorous clinical trials.[5,6]

The International Lipid Expert Panel (ILEP) has advised that these kinds of nutraceuticals as a lipid-lowering substitute for statins in populations that are intolerant to them[7] since they appear to be extremely safe and well tolerated. For instance, Red yeast rice (RYR) usage as a dietary supplement to decrease cholesterol appears to be generally safe and palatable in a large cohort of people with mild hypercholesterolemia.[8]

Herbal medications may have less negative effects, such as weariness, according to some reports. Although their effectiveness in treating lipid diseases is sufficiently supported, it is unclear how they work exactly. Additionally, several evaluations have shown how medicinal herbs may be used to treat lipid diseases. However, the majority of these studies have concentrated on single herbs or herbal compound medications. In vitro and in vivo investigations have recently shown a rising variety of therapeutic plants or plant-derived monomers with anti-dyslipidemic effects. These investigations shown that the main mechanisms for the modification of lipid metabolism, comprising cholesterol production, external absorption, transit, and cholesterol excretion, are susceptible to interference by herbal medications.[9]

The present study was done to evaluate and compare cholesterol lowering effects of Terminalia arjuna bark and Momordica charantia- fruit (Karela) extract on discarded pooled serum samples to check their effect on hyperlipidemia.

MATERIAL AND METHODS

Herbal extract of arjuna bark *(Terminalia arjuna)* and *Momordica charantia* (Karela) fruit in distilled water

(d/w) & cow's urine (c/u) (A1,A2,C1,C2) was taken and added to the pooled serum samples collected aseptically and a kinetic study was performed using it. Cholesterol standard was obtained from Erba chem Transasia kit (Trinder's method, endpoint) with standard cutoff value 200 mg/dl.

Standard preparation

Cholesterol standard was obtained from Erba chem Transasia kit (Trinder's method, endpoint) with standard cutoff value 200 mg/dl.

Reference standard: Herbal extract of arjuna *(Terminalia arjuna)* in distilled water (d/w) & cow's urine (c/u) was taken and added to the pooled serum samples collected aseptically and a kinetic study was performed with it.

Sample preparation: Pooled serum (discarded & non infectious) was taken and herbal extract in distilled water & extract in cow's urine of Karela *(Momordica charantia*- fruit) was added to the collected sample aseptically and a kinetic study was performed with it. Following samples were obtained:

PS: Pooled sample (discarded pooled serum)

A1: *Terminalia arjuna* (arjuna bark powder) soaked sample (300 mg in d/w for 12 hrs)

A2:- *Terminalia arjuna* (arjuna bark powder) soaked sample (300 mg in c/u for 12 hrs)

C1:- *Momordica charantia* (karela fruit powder) soaked sample (300 mg in d/w for 12 hrs)

C2:- *Momordica charantia* (karela fruit powder) soaked sample (300 mg in c/u for 12 hrs)

Aliquots were drawn at an interval of 0, 2 ,4 ,6 hours from each tube maintained in hot water bath at 37 ^{0} C.

Method: CHOD -PAP: **Enzymatic Colorimetric Determination of Serum Cholesterol,** is intended for the in- vitro quantitative determination of total cholesterol in serum and plasma on both automated and manual systems.

System used: ERBA CHEM EM - 200 AUTOANALYSER

- Automation: Fully Automatic
- Model: EM200
- Brand: Erba
- Usage/Application: Clinical

Erba EM200 Fully Automated Biochemistry Analyzer, random access and discrete clinical chemistry analyzer that enhances productivity and turnaround time. It has a throughput of 200 spectrophotometric tests per hour. Other instrument used was Vitros 5600 integrated system for confirming results.

RESULTS

Baseline reading in all the samples was 189 mg/dl (table 1).

Table 1: Changes in total cholesterol levels in pooled sample (PS), Terminalia arjuna bark soaked sample (300 mg powder in distilled water for 12 hours)-A1, Terminalia arjuna bark soaked sample (300 mg powder in distilled cow urine for 12 hours)-A2, Momordica charantia fruit-soaked sample (300 mg powder in distilled water for 12 hours)-C1, Momordica charantia fruit-soaked sample (300 mg powder in distilled cow urine for 12 hours)-C2.

Sample	Baseline	2 hrs	4 hrs	6 hrs
Cholestrol PS	189 mg/dl	187 mg/dl	186 mg/dl	183 mg/dl
A1	189 mg/dl	159 mg/dl	149 mg/ dl	109 mg/dl
A2	189 mg/dl	157 mg/dl	148 mg/dl	104 mg/dl
C1	189 mg/dl	172 mg/dl	150 mg/dl	113 mg/dl
C2	189 mg/dl	169 mg/dl	148 mg/dl	111 mg/dl

After 2 hours, total cholesterol reading in A1 was 159 mg/dl, 157, 172 and 169 mg/dl in A2,C1,C2 respectively (figure 1).

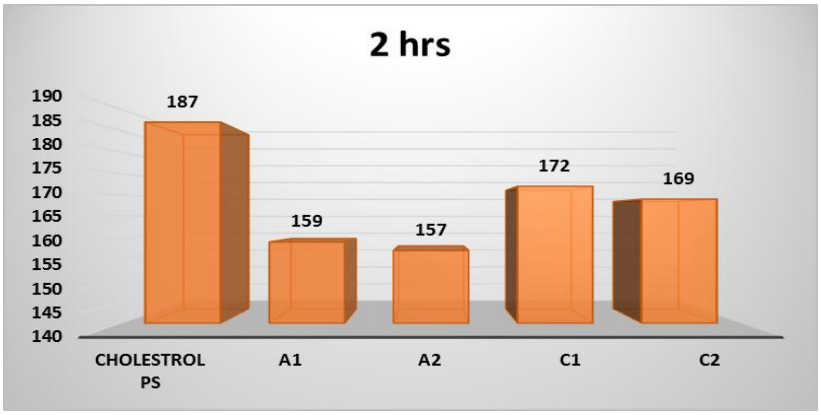

Figure 1: Readings of total cholesterol at 2 hours.

After 4 hours, total cholesterol reading in A1 was 149 mg/dl, 148, 150 and 148 mg/dl in A2,C1,C2 respectively (figure 2).

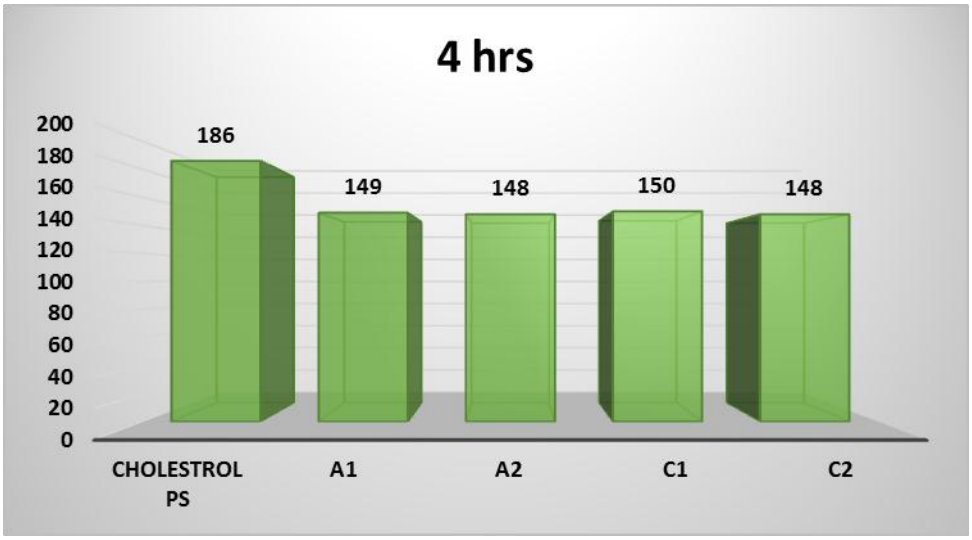

Figure 2: Readings of total cholesterol at 4 hours.

After 6 hours, total cholesterol reading in A1 was 109 mg/dl, 104, 113 and 111mg/dl in A2,C1,C2 respectively (figure 3).

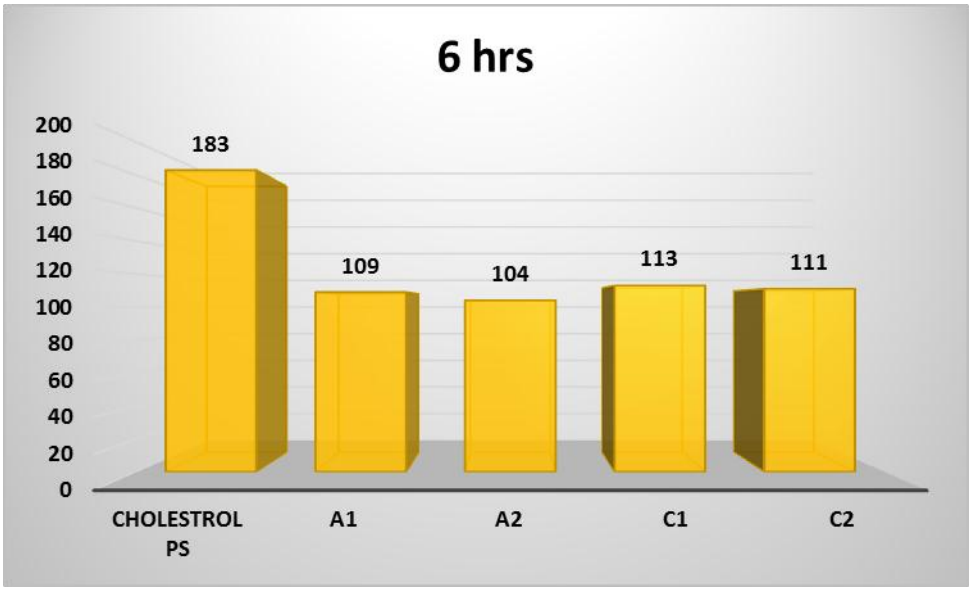

Figure 3: Readings of total cholesterol at 6 hours.

DISCUSSION

The pathogenesis of coronary heart disorders and myocardial ischemia have been linked to hypercholesterolemia and the atherosclerosis that results from it. Since lowering cholesterol levels may reduce the risk of CVD, great efforts have been made to accomplish this goal.[10] In the current investigation, *karela* fruit powder (Momordica charantia) herbal extract in distilled water and extract in cow's urine were utilized to assess its hypolipidemic impact by noticing a decrease in total cholesterol in a discarded pooled serum sample to check its effect on hyperlipidemia. As a reference standard, Arjuna bark powder (Terminalia arjuna) herbal extract in distilled water and cow's urine extract were used.

In the current investigation, samples that had been soaked in Arjuna and Karela for 2, 4, and 6 hours had significantly less total cholesterol than the control sample.

Through inhibiting cholesterol absorption by diosgenin (a steroidal sapogenin), dietary fibre, and the phytosterol content of bitter melon fruit/ karela, Rohajatien et al.[11] observed improvement of lipid profiles in diabetic mice fed with the fruit. Momordica charantia tablets were given in addition to oral diabetes medications to individuals with type-2 diabetes mellitus in a randomised controlled experiment by Kumari et al.[12] They noted Momordica charantia's beneficial effects on fat metabolism and came

to the conclusion that by reducing dyslipidemia, Momordica charantia might lower the risk of cardiovascular disease in people with type 2 diabetes mellitus. Glycosides, saponins, alkaloids, reducing sugars, resins, phenolic components, fixed oils, and free acids make up the Momordica charantia fruit. Effects are probably brought on by a number of the Momordica charantia's bioactive components.[13]

Atherogenic indices are effective predictors of the likelihood of developing heart disease, with a greater number suggesting a larger risk.[14] In a study done by Sethi J. et al., the Momordica charantia fruit extract group dramatically reduced atherogenic index; this was likely due to an increase in plasma HDL-cholesterol and a concurrent percentage reduction in atherogenic lipids. The percentage of protection against hyperlipidemia in the group treated with plant extract was 12.15 percent, further confirming the extract from the fruit of Momordica charantia's potent protective activity against hyperlipidemia. A 3-4% increase in the risk of heart disease is linked to a 1% drop in HDL cholesterol[14]

According to a research conducted by Priya et al., T. arjuna medication for one month resulted in a favourable alteration in the whole lipid profile.[15] According to a research included in S. Khalil's 2005 thesis revealed that using statins plus arjuna bark powder for three months reduced triglycerides, LDL cholesterol, and total cholesterol by 15%, 11%, and 16% respectively. Nitrites and lipoprotein levels only slightly decreased. As a result, it is possible that Arjuna and statins can reduce hyperlipidemia.[16]

CONCLUSION

From the findings of present study, it was found that extract of *Momordica charantia*- fruit (Karela) and *Terminalia arjuna* bark (Arjuna) extracts in distilled water & cow's urine were effective in reducing total cholesterol levels. It can be considered as a potential therapeutic alternative in patients with hyperlipidemia, & would also be beneficial in treatment of diabetes simultaneously ,but warrants further clinical studies.

Conflicts of interest: None.

Source of funding: None.

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