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Diet vs. Exercises – Which strategy is smarter to balance lipid profile: A ten-year case report

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Abstract

Poorly controlled lipids always have been posing a multitude of risks to the target population, especially cardiovascular ailments. Usually, they are controlled with statins. But it would be advisable to prepare a diet plan and chart exercises tailored to the needs of each individual, before starting with medications. When a person presents with hyperlipidaemia, doctors do have a key role as facilitators to motivate them for the same. The current case report is an experimental observational work done on one of the authors himself. Spanning over a time period of 10 years' different kinds of diet plans and exercise regimes were experimented. His co-authors went through the data that was collected, and this paper was compiled to throw some light upon the events. In spite of tweaking the exercises and diet plans many a time, a low calorie diet incorporating low carbohydrates and intermittent fasting were the crucial strategies to push lipids towards a healthy or safe zone.

Keywords: Intermittent fasting, lipid profile, low calorie, low carbohydrate, protein diet

1. Introduction

Abnormal lipid profiles have been found to be increasing in India. There exists poor treatment, inadequate control and reduced awareness of hypercholesterolemia, leading to an increase in the incidence of atherosclerosis [1]. The relevance of designing a diet plan tailored to the needs of an individual has always been ignored. An earlier study involving 120 overweight hyperlipidaemic volunteers showed that serum Triglyceride (TG) level decreased and High Density Lipoprotein cholesterol (HDL) level increased as part of a low-carbohydrate (LC) diet program (in comparison with low-fat diet) [2]. The significance of following a diet plan irrespective of whether an individual is exercising regularly is many a time not factored in for lowering unhealthy lipids. Regularly exercising alone can never negate the importance of a good diet in lipid management. In fact, poor dietary choices can overwhelm the benefits of exercising [3]. Irrespective of the ratio of macronutrients (carbohydrates, fat and protein); low-calorie diet plans have found to be beneficial in increasing HDL [4]. The present case report is unique since it is the first time a 10-year case study was performed to regulate the lipid levels comparing and contrasting interventions of diet plans, with and without exercises.

2. Materials and Methods

The first author for the last ten years (2012-2022) has been monitoring his lipids (Total Cholesterol-TC, TG, HDL, Low Density Lipoprotein-LDL and Very Low Density Lipoprotein-VLDL), and the liver enzymes Serum Glutamate-Oxaloacetate Transaminase (SGOT) and Serum Glutamate-Pyruvate Transaminase (SGPT). The readings were taken at least once in a year, as and when diet and or exercises required modifications (Table 1). The blood samples were given (between 7am and 9am), after a minimum fasting period of 12 hours and the analysis was done at a NABL (National Accreditation Board for Testing and Calibration Laboratories) accredited laboratory. Serum samples were used for estimation of the values, and the analysis was performed using dry chemistry technique on VITROS Analyser. The methods of estimation were: TC - Cholesterol Esterase Oxidase, TG – Enzymatic, HDL – Direct PTA/MgCl₂, LDL and VLDL – calculated, SGOT – Enzymatic dye P5P and SGPT – UV with P5P.

The author has been into exercise regimens and diet plans for the past ten years (Table 2), and had quantified and prepared the meals. Restriction of carbohydrates had to do away with certain types of carbohydrates (quality alone) whereas in a low carbohydrate diet the quantity (along with quality) was being moderated. The main source of carbohydrates was wheat roti, brown bread, wheat dosa, wheat idli and rolled oats. Protein sources were eggs, green gram, red gram, channa, dal, peanut butter, paneer/cottage cheese, chicken breast and fish (tuna, cobia, shark); the last two being lean sources of animal protein. Fat sources – paneer, cooking oil (extra virgin olive oil) and dry nuts (cashews and peanuts). Plain fresh salads were consumed on a daily basis. Once in two weeks there was a cheat meal in order to break the monotony.

Split training included one or two body parts per day whereas whole-body training involved all the body parts. For split training chest was combined with triceps and forearms, back was combined with biceps, and legs with shoulders and traps. In whole-body training there were three to four compound exercises combined with two or three isolation exercises on each day. Body-weight exercises were given as much importance as free weights and machine weights.

The findings in the first table have been linked with the second one. The author has been a non-alcoholic and non-smoker; he did not take any medications/training stimulants, but consumed tea/coffee two times a day. He has no history of any chronic diseases. At the end of 10 years, all the lipid profile parameters have moved to a very healthy or normal margin (Table 1).

3. Results and Discussion

The initial values in Table 1 are similar to the most common dyslipidaemia seen in India, i.e. borderline high LDL cholesterol, low HDL cholesterol and high triglycerides.¹ First lipid profile in 2008 demonstrated the HDL to be low. After repeating the test in 2012 he started 'brisk walking' regimen for almost a year, but it did not yield any favourable results. This was similar to a previous study where brisk walking had failed to show improvement in lipid profile¹⁵.

Subsequently exercises were started in fitness centre and the next two years' lipid profiles showed betterment of values; although the enzymes rose initially – could be due to the rapid change in food habits and macronutrients (restricted carbohydrates and normal protein diet).² Further, with a LC and high protein (HP) diet, all the parameters starting elevating in the next two years – 2016 and 2017. After

switching down from HP to normal protein (NP) diet and with tweaking of the exercise regimen the lipid profile again started improving, but the liver enzymes started to elevate, which led the author to discontinue the artificial protein supplements. This kind of improvement of the lipid profile (involving LC and protein diet) had been seen in earlier studies^{6,7}.

By the end of 2019 the TC and LDL values dropped, but the flow of experimentation was interrupted by the COVID-19 pandemic. The disruptions (loss of planned diet schedules and workout patterns) subsequently gave rise to an unfavourable report in the year 2020. For the next two years there were no exercises, but a strict LC and low protein (LP) diet plan was followed – two whole eggs per day were mandatorily consumed. There was surprising reduction in all the values especially the TC and TG, with increase in the HDL – which shows the importance of diet alone for obtaining a healthy lipid profile, especially the presence of egg yolks (dietary cholesterol).

There was an erroneous elevation of enzymes in February 2022 since the author had performed the tests the very next day of re-starting exercises, and existing literature explains the same¹⁸. From this point onwards the author switched over to a low-calorie (1400 to 1600 calories per day) LCLP diet, and incorporated intermittent fasting (IF) of 14 to 16 hours. Previous studies were in support of the role of low-calorie diet plans and IF towards improving lipid profile^{4,9,10}. As seen in literature the emphasis has been now shifted from consumption of the type of macronutrients (proteins, carbohydrates and fats) to the energy intake (calories) per day. In order to obtain a healthy lipid profile status, the role of calorie intake per day is seemingly more important than moderating the ratio of macronutrients consumed per day. IF in addition to improving lipid profile, has beneficial effects such as improving the immunity status of an individual. Lipid profile after low-calorie LCLP diet (with IF) was remarkably better. Since the author wanted to gain more muscle mass, the diet was stepped up from low-calorie LCLP to low-calorie LCNP diet. The lipid profile results (including enzymes) are the best that has been yet achieved (Table 1). The liver enzymes did not elevate this time, when the protein diet was brought to normal levels (from LP); no artificial protein supplements were consumed. When training strategies were compared, whole-body training was more helpful in achieving a healthy lipid profile.

3.1 Tables

Table 1: Lipid Profile and Enzymes monitored over the previous 10 years

Serial Number	Date (DD/MM/YR)	Lipid Profile					SGOT** (U/L)	SGPT** (U/L)
		TC* (mg/dl)	TG† (mg/dl)	HDL‡ (mg/dl)	LDL§ (mg/dl)	VLDL (mg/dl)		
1	15/11/2008	165	113	38	104	23	-	-
2	28/09/2012	227	124	41	156	25	28	28
3	02/08/2013	217	137	43	150	27	33	33
4	12/10/2014	173	101	39	114	20	77	78
5	08/06/2015	161	110	34	105	22	27	32
6	14/05/2016	191	209	42	107	42	38	-
7	26/02/2017	199	219	32	123	44	38	74
8	29/10/2017	150	119	35	91	24	88	83
9	11/03/2018	156	117	36	97	23	36	56
10	10/06/2018	186	132	38	122	26	43	75
11	28/10/2018	203	95	47	137	19	40	49
12	10/02/2019	195	96	46	130	19	35	32
13	11/08/2019	169	104	38	110	21	40	37
14	16/02/2020	201	123	37	139	25	-	-

15	12/09/2021	196	104	38	137	21	31	26
16	20/02/2022	185	79	45	124	16	108	50
17	24/04/2022	156	46	47	100	9	28	24
18	19/06/2022	142	48	44	88	10	22	23

Flagged values – *Total Cholesterol > 200, † Triglyceride > 150, ‡High Density Lipoprotein < 40, §Low Density Lipoprotein > 100, || Very Low Density Lipoprotein > 40, **Serum Glutamate-Oxaloacetate Transaminase > 60, †† Serum Glutamate-Pyruvate Transaminase > 50; Missing values are

Table 2: Exercise regimes and diet plans followed for the last 10 years

Duration/ Time Period	Exercise Regimen	Diet Plan	Supplements (if any)	Correlation to Blood Report (S. No. from Table 1)
Till 10/2012	Nil	Nil	N.A.	1, 2
10/2012 to 08/2013	Brisk Walking - 6 kilometres per day (1 hour) - 6 days/week	Nil	N.A.	3
09/2013 to 12/2015	1 hour of ST* (split training) and 30 minutes of AT† (cycling) - 5 to 6 days/week	RC‡ and RF§, NP (60 to 70 grams/day). Water – 3 to 4 litres/day	Multivitamin tablet (one/day), cod-liver oil 300mg (two/day)	4, 5
01/2016 to 09/2017	1 hour of ST (split training) and 30 minutes of AT (treadmill and cycling) - 5 days/week	LC** and RF, HP†† (80 to 100 grams/day). Water – 3 to 4 litres/day	Protein powder – 45grams/day, Multivitamin tablet (one/day), cod-liver oil 300mg (three/day)	6, 7
10/2017 to 10/2018	45 minutes of ST (split training) and 30 minutes of AT (treadmill and cycling) - 5 days/week	LC and RF, NP (60 to 70 grams/day). Water – 3 to 4 litres/day	Protein powder – 20grams/day, Multivitamin tablet (one/day), cod-liver oil 300mg (three/day)	8, 9, 10, 11
11/2018 to 10/2019	40 minutes of ST (whole-body training) and 10 minutes of AT (treadmill) - 4 days/week	LC (with carb cycling) and RF, LP‡‡ (20 to 30 grams/day). Water – 3 to 4 litres/day	Multivitamin tablet (one/day), cod-liver oil 300mg (two/day)	12, 13
11/2019 to 04/2020	40 minutes of ST (whole-body training) and 10 minutes of AT (treadmill) - 4 days/week	LC and RF, LP (20 to 30 grams/day). Water – 3 to 4 litres/day	Multivitamin tablet (one/day), cod-liver oil 300mg (two/day)	14
04/2020 to 02/2022	Nil	LC and RF, LP (10 to 20 grams/day). Water – 2 to 3 litres/day	Nil	15, 16
02/2022 to 05/2022	50 minutes ST (whole-body training) – 4days/week, No aerobic training	Low Calorie LC and RF, LP (10 to 20 grams/day) with IF§§ Water – 3 to 4 litres/day	Multivitamin tablet (one/day), cod-liver oil 300mg (two/day)	17
05/2022 to 06/2022	50 minutes ST (whole-body training) – 4days/week, No aerobic training	Low Calorie LC and NP (60 to 70 grams/day). Water – 3 to 4 litres/day	Multivitamin tablet (one/day), cod-liver oil 300mg (two/day)	18

*ST – Strength Training, †AT – Aerobic Training, ‡RC – Restricted Carbohydrate, §RF – Restricted Fat, ||NP – Normal Protein, **LC – Low Carbohydrate, ††HP – High Protein, ‡‡LP – Low Protein, §§IF – Intermittent Fasting

4. Conclusions

This ten-year case report is an eye-opener to the importance of a tailored and properly planned diet program with or without exercise regimes, if the focus is on obtaining a healthy lipid profile. Many a time the emphasis on diet is being ignored and the exercises are given undue importance for improving the health of an individual. More studies involving larger sample sizes are advisable to strongly validate the findings in this report. Such types of interventions can be compared with medications (statins).

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