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Effect of Clenbuterol using as weight loose on liver enzymes and lipids profile

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Objectives The current study is considered at the effect of 3 month using Clenbuterol for weight loss in 22 healthy men comparing them with 30 healthy men who do not take Clenbuterol.
Methods Samples of blood were taken from 52 healthy subjects who were divided into three groups: 12 subjects who are not training and not taking any medication (C), they are supposed to be the control group; 18 subjects training but not taking Clenbuterol (T No CLEN) group and 22 subjects training and taking Clenbuterol (T+CLEN)group. AST, ALT, ALP, lipase enzyme, total cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL) and low density lipoprotein (LDL) were measured .
Results It is found that there is an elevation in AST, ALT and lipase enzymes in T+CLEN and T No CLEN groups, but the ALP enzyme is increased in (T+CLEN) group only. TG level was increased more in T+CLEN group. On the other hand, HDL raised but LDL lowered its level in T No CLEN group. For TC and LDL levels, it is found that they were decreased in T No CLEN group and were not that much decreased in T+CLEN group when compared with T No CLEN group.
Conclusion It is concluded that Clenbuterol using for weight loss is not effective in a good way on body because it raised the level of liver enzymes which means there was overloading on it. In addition to that it increased the TG in blood stream which is harmful to human and health in general.
Keywords Clenbuterol, lipase, lipoprotein, weight loose.

Introduction

Clenbuterol is a powerful bronchodilator. It actively stimulates the beta-2 receptor, that is used to treat breathing disorders like asthma.[1] Through such stimulation, this reverses airway obstructions and provides improved breathing for those who need it. In humans, Clenbuterol has been used in tablet form as a bronchodilator at doses of 20–40 μg daily.[2] Clenbuterol has extended half-life (25-40 h), and is more readily absorbed (70%–80%) from the gastrointestinal tract.[3,4] More recently, however, the use of Clenbuterol has been used both as a weight loss enhancer[2] and a performance-enhancing drug.[5] Its effect as a bronchodilator causes the body to increase heart rate and blood pressure, which in turn enhances the body's BMR or Basal Metabolic Rate, causing the body to breakdown and metabolize energy much quicker.[6,7] For that, beyond treating breathing disorders, Clenbuterol is used in fat loss plans more than anywhere else. It is a very common fat burning tool used by many anabolic steroid users.[8] Papers on animal studies do exist to show that Clenbuterol does have an anabolic effect on both cardiac[9,10] and skeletal muscle.[11,12] For this, Clenbuterol has been used as a pharmacological ergogenic aid in sport on a widespread.[13] However, it is also used by non-steroid users for its fat loss properties.[14]

Clinically weight loss is defined as loss of more than 5% of usual body weight in 6–12 months. Weight loss is the result of decreased energy intake or increased energy expenditure.[15] And because of an effective role of Clenbuterol in fat loss properties, it has been used as a substance to help the body losing its weight.[2] General side effects from using Clenbuterol for weight loss were demonstrated as sympathomimetic effects from β2-receptor stimulation include tachycardia, supraventricular tachycardia, atrial fibrillation, palpitations, hypotension, vomiting, hyperglycemia, and hypokalemia.[16,17] In addition, some studies illustrated the hidden dangers of Clenbuterol abuse among bodybuilders, fitness enthusiasts, and those seeking a drug for weight loss.[2,8,18] Some researches is focused on the effect of Clenbuterol usage in veterinary animals[19], but there are a few researches talking about Clenbuterol effects, when using it for weight lose by human, on lipid profiles and liver enzymes level. For these reasons, this study is put to know what happens to liver enzymes and lipids levels in subject's body who use Clenbuterol to free themselves from excess weight.

Material and methods

The subjects

The present study was conducted on 52 healthy male subjects whose ages were between 18 and 30 yrs, with mean BMI 30.19 ± 3.52. Their mean weight and height were 99.65 ± 11.46 Kg and 181.4 ± 5.02 cm, respectively. All of them wanted to lose their weight and they did not have any diseases or take any drugs. The level of parameters in study group before starting research period demonstrated in Table 1 below:

They were divided into 3 groups: (12 male) control group who did not train or take any supplements (C), (18 male) training only did not take any medication (T NO Clen.), and 22 male who are training plus taking Clenbuterol (T+Clen.) (NOTE: take it by their will). Throughout the study period which was 3 months, all groups followed a special diet program. They ate their daily-meals which are rich in protein, moderate carbohydrate with low fats. The control group did not follow any training program but the other two groups (T NO Clen. and T+Clen.) were training in gym with special training program put and designed by their coach.

Table 1. **Levels of parameters in study group before starting research period**

Parameters	Reference range	Study group (*n*=52)
AST (IU/L)	0-38	7.89 ± 1.52
ALT (IU/L)	0-40	10.18 ±2.07
ALP (IU/L)	20-140	30.44 ±3.58
Lipase (U/L)	23-85	23.98 ±4.78
Total cholesterol (TC) mg/dL	< 200	173.98 ±8.89
Triglycerides (TG) mg/dL	40-160	117.48 ±7.41
High density lipoprotein (HDL) mg/dL	> 40	24.60 ±5.66
Low density lipoprotein(LDL) mg/dL	<160	117.04 ±9.87

Protocol of Clenbuterol using

The T+Clen. group used Airclen (hydrochloride Clenbuterol) manufactured by Thaiger Pharma company. They used it in cycle form, meaning not using in stable doses, that they began with 20 mcg dose and raised the dose to 140 mcg and then returned to 20 mcg. Table 2 illustrated the cycle of use.

Then they repeated this cycle again over the period of the study. The subjects could not stay on this cycle more than 3 months, they must cut-off using of Clenbuterol for at least 1 month and then return using it. For this reason, the period of study was 3 months.

The blood samples

Before and after the period of study, all samples of blood (3 ml) were taken on the morning period from all groups.

Laboratory analysis

Serum was obtained by centrifuging the blood samples at 3000 rpm for 15 min. The levels of AST and ALT enzymes were measured by using kits method from British Randox company. Lipase enzyme level was determined by using kit from American Cayman chemical company. Level of total cholesterol (TC), high density lipoprotein (HDL) ,triglyceride (TG), and ALP enzyme were estimated in all subjects by kits methods manufactured from French BioMerieux company. LDL level was calculated by using Friedewald formula.[20]

Statistical analysis of all data

The results are presented as mean ± S.D. All the results were statistically analyzed by applying (*t*) test and ANOVA test by using SPSS program. '*p*' value of <0.01 has been taken as statistically significant.

Results

The study showed a statistically significant decrease in weight (90.78 ±9.38) and BMI (27.66 ±3.51) in T NO Clen. group and in T+Clen group, their weight being 88.0 ±13.58 Kg and their BMI were 26.94 ± 4.15 for those who showed more lose in their weight and BMI when compared with the other groups as shown in Table 3. For the subjects in control group, they showed losing in their weight (95.42 ±10.24) and lowering their BMI (28.65 ± 2.62) but these results were not statistically significant.

For enzymes level (AST, ALT and lipase), in spite of increasing their levels in T NO Clen and T+Clen groups when compared with control groups, all enzymes levels were increased in T+Clen group more than in T NO Clen group. Whereas ALP enzyme was increased only in T+Clen group. Table 4 demonstrated these differences in levels.

In Table 5, TC, TG, and LDL levels were lower in T NO Clen group (133.24 ±7.65, 88.01 ± 6.63, 73.62 ±7 .91), respectively when compared with the other groups after the period of study. But in T+Clen group, TG level were more high (130.43 ±8.01) when compared with the other groups. At the other side, HDL level were increased in T NO Clen group more than in T+Clen group when compared with the control group.

Table 2. **Cycle using of Clenbuterol**

Doses of Airclen	**Week 1**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**
		20 mcg	40 mcg	60 mcg	80 mcg	100 mcg	120 mcg	140 mcg
	Week 2	**Day 8**	**Day 9**	**Day 10**	**Day 11**	**Day 12**	**Day 13**	**Day 14**
		140 mcg	120 mcg	100 mcg	80 mcg	60 mcg	40 mcg	20 mcg

Table 3. **Effects of study period on weight and BMI in the three groups**

Characteristics	Control group (*n*=12)		T NO Clen group (*n*=18)		T+Clen group (*n*=22)	
	Before study	After study	Before study	After study	Before study	After study
Weight (Kg)	97.83 ±11.51	95.42 ±10.24	98.94 ±10.07	90.78* ±9.38	100.18 ±11.39	88.0* ±13.58
BMI (Kg/m²)	29.37 ±2.92	28.65 ±2.62	30.13 ±3.64	27.66* ±3.51	30.69 ±3.77	26.94* ±4.15

Data are expressed as mean ± SD; (n) the number of subjects.
*Represents significant at $p<0.05$.

Table 4. **Effect of Clenbuterol using on liver enzymes and lipase levels in T+CLEN group compared with the other two groups**

Enzyme level	Control group (*n*=12)	T NO Clen group (*n*=18)	T+Clen group (*n*=22)	rLSD
AST (IU/L)	9.83 ±2.48 a	26.58 ±5.3 b	45.43 ±6.95 c	2.52
ALT (IU/L)	12.83 ±2.89 a	34.18 ±6.11 b	56.46 ±8.05 c	2.91
ALP (U/L)	33.01 ±5.45 a	37.59 ±4.79 a	42.76 ±4.92 b	2.39
Lipase (U/L)	28.11 ±5.44 a	44.69 ±8.20 b	60.13 ±6.94 c	3.18

Data are expressed as mean ± SD; (*n*) the number of subjects.
Deference in letters a, b, c represents significant at $p<0.01$.

Table 5. **Effect of Clenbuterol using on lipids profile levels in T+CLEN group compared with the other two groups**

Lipid profiles	Control group (*n*=12)	T NO Clen group (*n*=18)	T+Clen group (*n*=22)	rLSD
Total cholesterol (TC) mg/dL	166 ±7.96 a	133.24 ±7.65 b	149.75 ±7.19 c	3.36
Triglycerides (TG) mg/dL	102.44 ±5.76 a	88.01 ± 6.63 b	130.43 ±8.01 c	3.16
High density lipoprotein (HDL) mg/dL	24.58 ±5.91 a	43.87 ±4.69 b	36.10 ±5.58 c	2.39
Low density lipoprotein(LDL) mg/dL	116.64 ±10.36 a	73.62 ±7.91 b	92.0 ±4.41 c	3.28

Data are expressed as mean ± SD; (n) the number of subjects.
Deference in letters a, b, c represents significant at $p<0.01$

Discussion

This study improves the clear effect of Clenbuterol on losing weight and BMI in results especially in T+Clen group as shown in Table 3. The favorable effect of Clenbuterol on muscle growth is possibly due to specific increase in protein deposition of muscular tissue.[6,7] In other words, Clenbuterol affected on producing muscle hypertrophy and increased muscle strength.[21,22] Then, liver enzymes level may be raised in T+Clen group due to elevation of anabolic process in muscles and raises the activity of liver enzymes to produce amino acids which is needed in this process. Another reason for increase in the liver enzymes may be due to the thermogenic chemicals reaction of Clenbuterol by increasing body metabolism rate, causing organ and body system to function quicker and longer[23], then liver enzymes work more than normal and this elevation causes overload on liver. Such a result is noticed through raising AST, ALT, and ALP levels in this study. Free radicals or reactive oxygen species (ROS) are accumulated at repetitive muscle contraction[24] or other stress can lead to oxidative stress and related tissue damage.[25,26] Clenbuterol affects on liver cell by making lesion on it[27] because of its ability to form ROS[28] which leads to injury of hepatocellular and increasing the level of liver enzymes in blood.

Exercise has various effects on liver function enhancing both nutrient metabolism and antioxidant capacity.[29] In addition, exercise is increasing injury of liver cell.[30] This happened because exercise may cause hypoxia by decreasing blood flow in the liver[31] which causes or promotes an adverse effect from free radicals and lipid peroxidation.[32] Exercise-induced muscle injuries involve oxidative burst from immune cells leading to rapid ROS formation and subsequent oxidative damage.[33] For all these reasons, there is elevated liver enzymes in T No CLEN) group when compared with control group.

Lipase or lipoprotein lipase (LPL) is an enzyme that binds to circulating lipoproteins when present at vascular endothelium and is essential for hydrolysis of the TG contained in circulating lipoproteins.[34] It may play an important role in the regulation of TG formation[35] and can have a variety effects on metabolism.[36,37] Clenbuterol is considered one of beta androgen agonist that stimulates the beta-2 receptor which increases intracellular cAMP levels that activate hormone sensitive lipase via phosphorylation of LPL, which in turn causes a large increase in adipocyte lypolysis. [38,39] For this reason, the level of LPL enzyme is increased in T+Clen group. On the other hand, LPL level is elevated in T No CLEN group which agrees with study by Minato and Gorski et al.[40,41] LPL level is increased because LPL activity is increased significantly by walking[42] and running training.[43]

Levels of TC, TG, and LDL were raised in T+Clen group. This result interfered with study by Hadi and Ali and Buyse et al [44,45] but Sharma and Garg[46] found increasing in TC and TG levels in rats. Also, Anh and THuan[47] found increased in TG and LDL and decreased in HDL levels which concluded that Clenbuterol-induced dyslipidemia might reverse after withdrawing the usage of Clenbuterol. In results of the study, the level of LPL enzyme is increased and this interfered with TG level. Animals and human studies have demonstrated that Clen enhances lipolysis that minimizes protein degradation by increasing LPL activity.[48,21]

Conclusion

The present study shows that the misuse of Clenbuterol in losing weight has a pronounced effect on liver by making lesion from ROS that is formed from using it which results in raised liver enzymes level. Despite the good influence in weight loss for the group that uses Clenbuterol, it is noticed that TC, TG, and LDL levels are increased that would lead to increasing the risk of stroke.

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