

Serum Cholesterol Levels in Homicidal Offenders

A Low Cholesterol Level Is Connected with a Habitually Violent Tendency under the Influence of Alcohol

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Abstract. Serum cholesterol fasting concentrations were measured in 280 male homicidal offenders. Those with an antisocial personality or an intermittent explosive disorder with a habitually violent tendency in both when under the influence of alcohol showed a lower mean level of serum cholesterol than did other offenders. The results were also compatible with the hypotheses that antisocial personality consists of two groups. The exact reason for the finding is not clear but it could be connected with an enhanced insulin secretion.

Introduction

The consumption of alcohol is frequently connected with a wide range of violent behaviour [1, 2]. Substantial levels of alcohol have often been found among persons arrested immediately after criminal homicide [3, 4]. A significant number of rapists have also admitted to having consumed large amounts of alcohol before rape took place [5, 6]. Many men who beat their wives or assault their children, also drink alcohol before violent episodes [7, 8].

Habitually violent tendencies have often been found to be typical in antisocial personality and in intermittent explosive disorder [9]. Certain abnormalities in glucose metabolism seem to be connected with violent tendencies [10–12], and especially in cases of antisocial personality [13–15] and of intermittent explosive disorder [13].

There have been earlier hints that among habitually violent and criminal offenders with antisocial personality there is also some kind of 'abnormality' in lipid metabolism. In an earlier study carried out by Virkkunen [16] on young adults with antisocial personality there was a finding of low cholesterol level. Stewart and Stewart [17], however, were unable to demonstrate similar finding in material of patients with antisocial personality in a psychiatric hospital. Their material, however, was obviously more normal than the material in the first-mentioned study.

There have been preliminary findings suggesting an enhanced insulin secretion among those with antisocial personality who have had an unsocialized aggressive conduct disorder in adolescence and later an abnormal and habitual tendency to violence when under the influence of alcohol [14]. The low cholesterol level seems to be connected with this [14]. The enhanced insulin secretion, of course, is related to the glucose metabolism mentioned above.

So it seemed probable that the low cholesterol level is connected with the habitually violent tendencies under the influence of alcohol. The purpose of the present study was to verify this.

Material and Methods

Offenders

In the Mental Examination Department of the Psychiatric Clinic of the Helsinki University Central Hospital, 280 successive male homicidal offenders were investigated during 1974–1981. The mental investigations were either carried out by the author himself, or they were made under his supervision and he interviewed all the offenders, checking the criteria personally. All had committed one or more capital offence. In Finland practically all homicidal offenders are sent for mental examination, so the material is representative. The control material was composed of 50 persons with antisocial personality who did not habitually have a tendency to violence when under the influence of alcohol. They had usually committed only various kinds of crimes against property.

Table I. Characteristics of the various groups of homicidal offenders and of the group of persons with antisocial personality without the habitually violent tendency under the influence of alcohol (mean values \pm SD)

	Homicidal offenders			Group D (n = 50)	A/B	A/C	A/D	B/C
	group A (n = 73)	group B (n = 100)	group C (n = 107)					
Weight, kg	72.8 \pm 11.8	74.9 \pm 9.9	80.0 \pm 11.4	71.5 \pm 8.8	0.79	2.30	0.35	1.83
Height, cm	173.9 \pm 7.4	176.6 \pm 11.1	178.3 \pm 4.4	179.3 \pm 6.7	0.63	1.65	1.77	0.45
Intelligence (IQ)	92.4 \pm 17.2	98.1 \pm 15.8	94.8 \pm 18.3	101.0 \pm 14.1	2.24	0.87	2.93*	1.38
Mentally retarded (IQ under 68)	4	1	11	1				
XYY syndrome	1	—	—	—				
XXY syndrome	—	—	2	—				

* $p < 0.01$. Group A: persons with antisocial personality with habitually violent tendency under the influence of alcohol; group B: persons with intermittent explosive disorder with habitually violent tendency under the influence of alcohol; group C: other homicidal offenders without the habitually violent tendency under the influence of alcohol; group D: persons with antisocial personality without the habitually violent tendency under the influence of alcohol.

Among the 280 homicidal offenders there were 173 with a habitual tendency to violence under the influence of alcohol. Of these, 73 had an antisocial personality and 100 had an intermittent explosive disorder. The remaining 107 homicidal offenders did not habitually behave violently under the influence of alcohol. They included 18 schizophrenics, 3 paranoid psychoses, 4 organic psychoses, 53 paranoid personalities, 21 passive-aggressive personalities, 53 paranoid personalities, 21 passive-aggressive personalities and 3 dependent personalities; and in addition there were 5 persons with antisocial personality without the habitually violent tendency when under the influence of alcohol, who had, however, committed an accidental homicide.

There was no statistical difference between the groups as regards weight or height (table I). In antisocial personality, intelligence was higher among persons without than persons with the habitually violent tendency suiting the earlier finding [18].

The homicidal offenders with antisocial personality or intermittent explosive disorder had all committed the capital offences while under the influence of alcohol. However, those who had an antisocial personality had been drinking on average for 7.6 ± 2.3 h before the offence, and those with an intermittent explosive disorder for 7.4 ± 2.2 h. Among the other homicidal offenders the drinking period had been much shorter, the average duration for all these persons being only 2.9 ± 2.5 h. In the alcohol-positive cases it was 4.8 ± 3.5 h. It was typical of the habitually violent offenders that they had a poor appetite or no appetite at all during the long-lasting drinking periods before the homicide.

Criteria for Personality Disorders

When the material was being collected the criteria used during the first years for assessing the personality disorders were those of Feighner et al. [19]. The earlier drafts of DSM-III was used during the late 1970s. At the end of 1981 all the offenders were checked once more by means of the criteria in the final version of DSM-III [9]. During mental examinations it is customary to collect all kinds of information from relatives, friends, school authorities, various employers, psychiatric hospitals, open care centers, treatment places for

alcoholism and so on. With this information in addition to the personal interviews it was easy to check the criteria.

To fulfil the criteria for intermittent explosive disorder the offender had to have several discrete episodes of loss of control of aggressive impulses, resulting in serious assault or destruction of property. The behaviour in these cases had been grossly out of proportion to any precipitating psychosocial stressor [9]. However, violent offenders whose habitual violence had been directed against their wives in family quarrels were not included unless they had also committed other violent acts against other people or against property. They usually fulfilled the criteria for paranoid personality or paranoid psychoses.

Cholesterol and Triglyceride Measurements

On the day following admission, serum sampling to determine the cholesterol level was carried out both on the subjects and on the controls, after a minimum of 12 h fasting. The determinations were made enzymatically [20].

During the years 1978–1981 triglyceride measurements enzymatically were also made on all mental offenders [21]. They were carried out on 163 of the homicidal offenders and on 10 of the persons with antisocial personality without a habitually violent tendency.

Results

As can be seen from table II, among the persons who had an antisocial personality or an intermittent explosive disorder and who habitually tended to be violent under the influence of alcohol, the cholesterol levels in the lowest age groups were markedly lower than the levels among the other homicidal offenders of corresponding age. This was also the case when the comparisons were made with those who had an antisocial personality but were not

Table II. Serum cholesterol values (mmol/l) among homicidal offenders and among the group of persons with antisocial personality without the habitually violent tendency under the influence of alcohol

Age group, years	Homicidal offenders						Group D		A/B	A/C	A/D	B/C
	group A		group B		group C		n	mean ± SD				
	n	mean ± SD	n	mean ± SD	n	mean ± SD						
Under 20	14	4.19 ± 0.62	7	4.01 ± 0.49	9	5.60 ± 0.41	10	5.25 ± 0.61	0.67	6.03**	4.17**	7.10**
21–30	26	4.92 ± 0.61	27	4.85 ± 0.67	19	6.18 ± 0.66	32	6.06 ± 0.84	0.43	6.66**	5.78**	6.71**
31–40	13	6.05 ± 0.86	34	5.63 ± 1.29	30	6.66 ± 0.89	8	6.21 ± 0.63	1.06	2.10	0.47	3.67**
41–50	9	6.06 ± 0.93	13	5.52 ± 0.64	30	6.74 ± 1.09	–	–	1.57	1.74	–	3.75**
Over 50	11	6.25 ± 1.16	19	5.37 ± 0.92	19	6.44 ± 0.64	–	–	2.28	0.59	–	4.16**
All homicidal offenders	73	5.32 ± 1.09	100	5.24 ± 1.05	107	6.47 ± 0.90	50	5.92 ± 0.83	0.46	7.71**	3.28**	9.04**

** $p < 0.001$. See footnote to table I for definitions of groups.

Table III. Serum triglyceride values (mmol/l) among homicidal offenders and among the group of persons with antisocial personality without the habitually violent tendency under the influence of alcohol

Age group, years	Homicidal offenders						Group D		A/B	A/C	A/D	B/C
	group A		group B		group C		n	mean ± SD				
	n	mean ± SD	n	mean ± SD	n	mean ± SD						
Under 20	10	1.07 ± 0.47	6	1.00 ± 0.40	4	1.53 ± 0.37	3	1.20 ± 0.44	0.31	1.73	0.43	2.09
21–30	13	1.43 ± 1.25	12	1.22 ± 0.34	11	1.39 ± 0.54	5	1.12 ± 0.19	0.60	0.10	0.54	0.98
31–40	10	1.49 ± 0.44	20	1.88 ± 0.97	18	1.75 ± 0.69	2	1.30 ± 0.57	1.20	1.09	0.54	0.45
41–50	6	2.05 ± 1.33	8	2.39 ± 0.90	15	2.51 ± 1.33	–	–	0.57	0.72	–	0.24
Over 50	7	1.60 ± 0.36	10	1.63 ± 0.87	13	1.86 ± 0.72	–	–	0.09	0.89	–	0.70
All homicidal offenders	46	1.47 ± 0.89	56	1.67 ± 0.88	61	1.88 ± 0.93	10	1.18 ± 0.32	1.12	2.31	1.01	1.28

See footnote to table I for definitions of groups.

habitually violent under the influence of alcohol. In accordance with these findings, it seems that there are two separate groups of those with antisocial personality suiting to the earlier findings [14].

The fact that there was not much difference between the habitually violent persons with antisocial personality and the intermittent explosive disorder group proves that the etiology in these syndromes is at least partly the same. This is also compatible with the earlier findings of a reactive hypoglycaemic tendency among both these groups in middle age [13, 15].

The triglyceride values were not connected with the habitually violent tendencies under the influence of alcohol (table III).

Table IV. Correlation of low cholesterol levels with suicidal attempts, slashings and the father's violence under the influence of alcohol among homicidal offenders

	Present	Not present	p
Suicidal attempts (n = 78)	5.32 \pm 1.07	5.89 \pm 1.16	3.74**
Slashings (n = 29)	5.12 \pm 0.90	5.80 \pm 1.17	3.04*
Father's violence under the influence of alcohol (n = 115)	5.26 \pm 1.06	6.06 \pm 1.12	5.99**

* $p < 0.01$; ** $p < 0.001$.

In the whole group of homicidal offenders there were very clear correlations between the low cholesterol level and a habitual tendency for violence under the influence of alcohol also among the fathers (table IV). The low cholesterol level also correlated with the violent tendencies against oneself, such as suicidal attempts and slashings.

Discussion

It seems that a low cholesterol level among violent offenders in the younger age groups is a good and easily measured indicator of dangerousness (habitual violence). A possible reason why this habitually violent tendency under the influence of alcohol and the low cholesterol level are connected with each other could be that there is an enhanced insulin secretion underlying both aspects. An enhanced insulin secretion has so far been proven among the violent offenders whose antisocial personality was preceded by the unsocialized aggressive conduct disorder [14]. Possibly the same is also true among those with intermittent explosive disorder, because both groups tend to have reactive hypoglycaemia in middle age [13, 15].

The so-called alcohol-induced fasting hypoglycaemia characteristically develops in chronically malnourished or more acutely food deprived individuals within 6–36 h of ingesting a moderate to large amount of alcohol [22]. In this study the homicidal offenders with an antisocial personality or an intermittent explosive disorder had usually been drinking alcohol for over 7 h and they had had a very poor appetite or no appetite at all during this period. Moreover, alcohol is also able to further increase the insulin secretion caused by the glucose level (alcohol-induced reactive hypoglycaemia) [22]. So it is quite possible that the habitually violent offenders were in a very grave reactive hypoglycaemia when the homicides were committed.

The finding that triglyceride values were not connected with habitually violent tendencies under the influence of alcohol was possibly due to the fact that the enhanced insulin secretion starts to heighten triglyceride values already at quite an early age.

Why then could a low cholesterol level be connected with an enhanced insulin secretion? Insulin is not only connected with carbohydrate but also with lipid metabolism. In cholesterol metabolism the cholesterol is excreted from liver in VLDL to the blood. This is changed by enzyme lipoprotein lipase to LDL cholesterol (the greatest part of cholesterol in man is just this LDL cho-

lesterol). The lipoprotein lipase is regulated by insulin [23, 24]. LDL cholesterol is catabolized in peripheral tissues and the rapidity of this catabolism determines the LDL in the plasma, and thus the cholesterol level. How much LDL is able to get to the peripheral tissues depends on the so-called LDL receptors on the surfaces of the cells [25, 26]. Insulin increases the LDL receptor number and thus LDL degradation [27], but it can also stimulate intracellular lysosomal enzyme activity [28]. The low serum cholesterol can be a result of all these metabolic phases.

Preliminary results have suggested that habitually violent tendencies and impulsiveness correlate with CSF amine metabolites, especially the low serotonin metabolite 5 HIAA [29, 30]. The bulk of other evidence also seems to indicate that both in laboratory animals and in man reduced brain serotonergic control, either genetically predetermined or chemically or dietarily induced, correlates with abnormal aggression and violence [31]. Moreover, an impulsive violent suicidal tendency has been found to be closely connected with the low CSF level of 5 HIAA [32, 33]. In the present study, too, the low serum cholesterol level seemed to be connected with impulsive suicidal behaviour, as well as with violence. There is at the same time evidence that intracellular pancreatic B cell serotonin acts as tonic inhibitor of insulin release [34–36]. Also, drugs reported to be specific serotonin antagonists potentiate the release of glucose-induced insulin among normal subjects [37].

Future studies carried out on habitually violent and impulsively suicidal persons are needed to clarify the connections with a low cholesterol (LDL cholesterol?) level, insulin secretion and serotonin metabolism.

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