

ABNORMALITIES IN LIPID METABOLISM WITH HEROIN ADDICTION

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Summary

Twenty seven heroin addicts and ten non-addicts were randomly selected from Jaffna Municipality and suburbs. Their mean ages were 26.8 (± 5.5) years and 25.8 (± 8.6) years respectively. Among the 27 addicts 55.6% took heroin intravenously. Serum cholesterol and triacylglycerol levels of the heroin addicts were also significantly elevated. Body weights and serum protein levels were estimated to assess their nutritional status. The difference in serum protein and body weights were statistically not significant. These results indicate that the addicts are not malnourished. Mean blood pressure of heroin addicts and controls was 122 (± 10.2) mm Hg/79 (± 9.8) mm Hg and 120 mm Hg/80 mm Hg respectively. The results from AIDS diagnostic test showed that none of the heroin addicts had been infected with HIV.

Introduction

Heroin addiction is becoming a serious problem in Sri Lanka as in many other countries. Heroin dependence is commonest among young

people. Enforcement statistics indicate that persons most often involved in drug related offences are between 18 and 30 years of age (1). Of the users in Sri Lanka 2.7% had their experience before the age of 12, 13.3% between the ages of 12 and 16 years and the balance 84% after they were 16¹. The drug is freely available for prices of SLR 300 - 350 per gram (1). Heroin is a narcotic derived from opium (2). When taken orally, heroin can produce relaxation, euphoria and indifference to pain and stress but not 'rush' (2). When the drug starts to be regularly administered, the addicts develop physical dependence and tolerance. 'Withdrawal syndrome' develops when the drug is stopped (3). Most of the physical damage is caused by the manner in which the drug is administered (2). Addicts administering heroin intravenously are at high risk of infection with HIV (Human Immune deficiency Virus) because HIV virus is mainly transmitted by sharing of contaminated needles and syringes (4). In New York 45% and in the whole of USA 25% of AIDS victims were intravenous drug abusers (4,5). In Italy 44% of AIDS cases are drug abusers (6). Among the age group 15 to 35, drug abuse is the leading cause of death (7). Heroin addicts were also victims with needles remaining in their veins who had died after self-administration of drugs (7).

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This paper describes the changes in serum lipids of heroin addicts. Further serum protein, body weights and blood pressure were determined to assess their nutritional status. ELISA screening for HIV antibodies was employed to detect the HIV infection in intravenous drug addicts.

Subjects and Methods

Subjects

Twenty seven heroin addicts and ten non-addicts within the age group of 20-30 years from Jaffna Municipal limits and its suburbs. A questionnaire was prepared and necessary details were collected (Table 1).

Table 1 : Distribution of addicts based on the countries from which they learnt the habit.

Countries	%
Sri Lanka	56.0
India	33.5
Europe	10.5

Analytical Methods

Triacylglycerol (8) cholesterol (9) and protein⁽¹⁰⁾ levels in serum were estimated. Body weight was determined and blood pressure was recorded by mercurial sphygmomanometer.

Enzyme Linked Immunosorbent Assay (ELISA) was carried out to test for antibodies against HIV by Bacteriology Unit of Central laboratory of VDRL Unit, Department of health, Colombo through the VDRL Unit of Teaching Hospital, Jaffna.

Results and Discussion

Among the 27 subjects, three were married and all the subjects were males. Occurrence of divorce was found to be 3.7% (one). Five of the subjects have the habit of alcoholism in addition to drug addiction. Earlier reports state that 11.7% had used alcohol and 9% had used tobacco (1). The average daily consumption of a heroin dependent is presently in the region of 500mg.(1)

Twelve of the subjects (44%) learned the habit when they were abroad (Table 1). Fifteen of the addicts (55.6%) have taken drug intravenously at least once (Table 2). Two (7.4%)

Table 2 : Mode of heroin intake among the addicts.

Mode of intake	%
Smoking	14.8
Intravenous	55.6
inhaling	29.6

Two have had multiple sexual contacts with women of AIDS risk group. All fifteen intravenous addicts showed negative results to ELISA screening for HIV antibodies. However this does not rule out the possibility of drug addicts in Jaffna having acquired HIV, since the sample tested for is very small.

Only 14.8% take heroin by smoking alone, 29.6% inhale heroin vapour, meanwhile the intravenous addiction was 55.6% (table 2). These results

indicate that with continuous use of heroin, many of them had become tolerant and had changed the mode of administration from smoking to intravenous injection. The mean duration of addiction was 4.2 (± 1.7) years. From earlier reports it was found that the route of administration most favoured was by inhalation (87%), while 11% smoked it in cigarettes and the balance 2% had snuffed or injected the heroin (1). The primary source of introduction to this drug in the

case of majority of those who are dependent, (80%) was friends. Tourist and drug peddlers were others who were responsible. Curiosity has been one of the major reasons for the first experience with drugs.¹

Both serum cholesterol and triacylglycerol levels were elevated in heroin addicts. Mean serum cholesterol level of heroin addicts and non-addicts were 425.6 (± 102.8) mg dl⁻¹ and 217.3 (± 36.1) mg dl⁻¹ respectively (Table 3)

Table 3 : Mean serum cholesterol, triacylglycerol and protein levels in heroin addicts and non-addicts.

Subjects	Cholesterol mg dl ⁻¹	Triacylglycerol mg dl ⁻¹	Protein g dl ⁻¹
Addicts	425.6 (± 102.8)	396.5 (± 244.7)	9.6 (± 2.21)
Non-addicts	217.3 (± 36.1)	209.6 (± 177.8)	9.9 (± 1.4)

Elevation in serum cholesterol level was statistically significant ($P < 0.001$). Mean serum triacylglycerol level of heroin addicts was 396.5 (± 244.7) mg⁻¹ while that of non-addicts was 209.6 (± 177.8) mg dl⁻¹ (Table 4). This elevation too was statistically signifi-

cant ($P < 0.001$). These marked elevations in triacylglycerol and cholesterol levels may be primarily due to heroin. This was supported by the serum protein levels of addicts and non-addicts which were 9.9 (± 1.4) g dl⁻¹ and 9.6 (± 2.2) g dl⁻¹ respectively

Table 4 : Mean age, weight and blood pressure of heroin addicts and non-addicts.

Subjects	Age (In years)	Weight (kg)	Blood pressure SBP/DBP (mm Hg)
Addicts	25.8 (± 5.5)	57.0 (± 9.8)	121.7 (± 10.2) 79.2 (± 9.67)
Non addicts	25.8 (± 8.6)	59.0 (8.2)	120.2 (± 3.6) 80.1 (± 2.3)

(Table 3). Difference in mean serum protein levels was not statistically significant ($P < 0.5$). Mean weight of the addicts and non-addicts were 57 (± 9.1) kg and 59 (± 8.2) kg respectively (Table 4). The difference was not significant statistically ($P < 0.5$). Both protein level and body weight indicate that the addicts were not malnourished. Hence, factors other than nutrition could be affecting lipid metabolism of the addicts. Possible explanation for these observations is that heroin activates lipolysis in adipose tissue through its metabolite morphine, by increasing CAMP levels either directly or through growth hormone and catecholamine.⁽¹¹⁾ The increase in CAMP causes the breakdown of stored fat in adipose tissue which results in an increase in serum free fatty acid and glycerol levels.⁽¹²⁾ Part of fatty acid entering the liver would have been converted into triacylglycerol and cholesterol leading to their elevation in serum. Hypertriglyceridaemia and hypercholesterolaemia can lead to other complications such as atherosclerosis, bile stones, ketoacidosis etc⁽¹²⁾. In contrast to what may be expected due to high concentration of cholesterol, the systolic and diastolic blood pressures were normal, mean being 121.7 (± 10.2) / 79.2 (± 9.8) mm Hg respectively (Table 4). This

could be due to the short duration of the heroin addiction as the subjects were taking the drug for a mean period of 4.2 (± 1.7) years. None of the subjects had reported possible symptoms and complaints of heart diseases or atherosclerosis. However with continued addiction to heroin these subjects are at risk to heart diseases.

Conclusion

The results indicate that the heroin addicts develop tolerance to the drug with continuous use and start to change their mode of intake from smoking to inhalation and then to intravenous injection. The elevation in serum triacylglycerol and cholesterol level indicates the effect of heroin on lipid metabolism. However the protein metabolism was unaffected. The blood pressure did not alter in heroin addicts significantly. This may be accounted for by their short duration of intake of the drug.

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References

1. Illicit drug trafficking and drug abuse in Sri Lanka (1986). National dangerous drug control board, 4-7.
2. Osol, A. (1975). Remington's Pharmaceutical Sciences. Ed. Osol, A. 15th Ed. Mack Publishing Company, 433 : 1287.
3. Stimson, C. V., Oppenheimer, E. (1983.) Heroin addiction Treatment and control in Britain, Ed Stimson, C. V, Javistock Publication, New York; 2-4
4. Burning, E. C., Coutinho, R. H., van Brussel, G. H. A., van Santeri, G. W., van Zadelhoff A. w. (1986). Preventing AIDS in drug addicts in Amsterdam. The Lancet June 21, 1435.

5. Curran, J.W., Margan, W. H., Starcher E. T., Hardy, E. M, and Jafie, H.W (1985) *Cancer Research*; 45 : 4602 - 4604.
6. Pristera, R., Casini, M., Perino, F. and Degiorgis, A. (1987). Drug addiction and fear of AIDS. *The Lancet*, Jan. 17, 160.
7. Abelson, P H. (1970). Death from heroin, *Science*, 168 (3937) : 1289.
8. Triacylglycerol, Manuel method, Recommended by WHO.
9. Cholestrol, Modified Liberman - Buchard method, Recommended by WHO.
10. Lowry, D. H., Rosenbergh, M. H., Farr, A. L. and Randall, R. J. (1951). Protein measurements with Folin - phenol reagent. *Journal of Biological Chemistry*; 193:265 275.
11. Gannong, F. W. (1983). Review of Medical Physiology. Ed. Gannong, F. W. 12th Ed. Lange Medical Publications, Maruzen Co' Ltd.; 249-250, 235-336.
12. Mayes, A- P. (1985). Harpers Review of Biochemistry. Eds. Martiss, W. D. Mayes, A. P., Rodwell, W. V. and Granner, K. D. 20 th Ed. Lange Medical Publication Maruzen Asia.; 243, 248, 253, 267-271.