CONCLUSIONS

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7.1. The results of the present study indicate that “syndrome X” is a definite entity. This conclusion is drawn from the following results as obtained in the present study:

7.1.1. There is a strong and significant tendency for the three factors, viz., hypertension, IGT and dyslipidaemia (defined as raised serum triglycerides or lowered HDL or both) to cluster together in presence of hyperinsulinaemia. This clustering occurs much more frequently than would be expected by mere chance.

7.1.2. Presence of hyperinsulinaemia (a reflection of insulin resistance) is essential for this clustering to occur. In the absence of hyperinsulinaemia, these three factors do not tend to cluster significantly.

7.1.3. The clustering of risk factors is very specific and includes hyperinsulinaemia, IGT, hypertension, raised triglycerides and lowered HDL, but does not include factors like raised serum cholesterol or LDL, which are otherwise potent coronary risk factors.

7.2. The optimum definition of syndrome X that emerges from the results of this study is “clustering of raised fasting insulin level (upper most quintile) with any two of the other three factors, viz, IGT hypertension and dyslipidaemia (i.e., either raised triglycerides or lowered HDL or both)”. This suggested definition is further strengthened from the findings of this study that it is at the level when hyperinsulinaemia clusters with any two of the other three factors (narrated above), the risk of IHD becomes very strong and significant.

7.3. The prevalence of syndrome X in the study population was found to be 8.47% (95% CI 6.27% to 10.67%). This is a substantial magnitude indicating that almost one out of every twelve middle aged army persons is likely to suffer from this syndrome, thus being exposed to the high risk of IHD and NIDDM that this syndrome carries.
7.4. Since personnel of Indian army are drawn from the Indian population at large one can also roughly suggest that syndrome X is likely to be a public health problem of sufficiently high magnitude in the Indian population at large. In addition, given the fact that Indian army soldiers are exposed to regular physical exercises and are likely to be more fit than their civilian brethren, the magnitude of problem of syndrome X is likely to be even more among the civilian population as compared to the army personnel. There is, therefore, a need to study the magnitude of syndrome X in the general population of our country at large.

7.5. Factor analysis of the various components of syndrome X also indicated that this syndrome is likely to be constituted of three distinct entities, viz. “blood pressure factor”, “blood sugar factor” and the “lipid factor”, with fasting insulin providing the common interlining bond between these 3 factors. In addition, generalized obesity and abdominal obesity account for additional inter-linking between the “blood pressure factor” and the “lipid factor”.

7.6. The results of this study after analyzing the data through multivariate models clearly indicate that the major determinants of syndrome X are behavioral, being related to life style. These include increasing body weight, increasing abdominal obesity (as measured in terms of WHR), not spending adequate energy in physical exercise, and lack of physical fitness (as indicated by raised resting heart rate).

7.7. The results also indicated that for optimum prevention of syndrome X, one should spend more than 2800 kcal per week in physical exercise. Moreover, such expenditure should be phased over the entire week, spending at least three and a half hours per week on physical exercise of vigorous intensity or at least of a moderately strenuous nature.

7.8. The two major anthropometric parameters which were observed to be having a very strong and significant relationship with syndrome X were body mass index (at a level of >= 24.5) and waist : hip...
ratio (at a level >= 0.95). Thus, these two parameters can be used for easy and quick assessment of the risk of syndrome X.

7.9. On the basis of mathematical models developed in the present study, a simple, clinico-epidemiological algorithm has been developed. This algorithm says "From the body mass index of an individual, subtract 4.704 if he spends more than 2800 Kcal per week on physical exercise (otherwise nothing is to be subtracted); add 2.741 if his waist : hip ratio is >= 0.95 (otherwise nothing is to be added); and further add 2.222 if his resting heart rate is > 72 beats per minute (otherwise nothing to be added). Now, if the total score is more than or equal to 26.778, then this individual has high risk of syndrome X". This simple rule, which carries sensitivity as well as specificity values of approximately 75% each, can be easily used by even the paramedical health care workers to identify persons at high risk of syndrome X.

7.10. The study results have also given a clear indication that syndrome X is strongly and significantly related to the risk of IHD. Steps to prevent syndrome X in the reference population will therefore go a long way in minimizing the risk of IHD.

7.11. Based on these important findings, the following recommendations are submitted for prevention and management of syndrome X in the reference population, i.e., the Indian army.

7.11.1. A physical exercise policy incorporating a scientific schedule needs to be implemented in the Indian army for all personnel aged 35 years and above. Against the background of the findings of the present study that the optimum level would be to spend 2800 kcal per week through vigorous or moderately strenuous exercise spread over at least three and a half hours in a week, the following schedule is suggested:- "Light jogging (at a speed of 8 Kilometers per hour approximately) for 45 minutes a day; or brisk walking (at 6 kilometers per hour) for an hour a day, to be undertaken on six days in week, keeping Sunday as the rest and maintenance day". Strict implementation of this schedule
through administrative procedures as well as through motivating and educating the personnel is likely to go a long way in primary prevention of syndrome X.

7.11.2. Dietary education to all ranks and families, right from the younger age, so that the correct dietary habits are inculcated, thus keeping the body weight under control.

7.11.3. Measurement and recording of BMI and WHR should be made an essential component of all clinical protocols as well as incorporated in the periodic medical examinations in the army. Persons having BMI of 24.5 and above or WHR of 0.95 and above, should be suitably advised regarding diet and exercise. If required, they should also be subjected to further diagnostic work-up.

7.11.4. The clinico-epidemiological algorithm developed in this study may be put to operational use for quick identification of persons at high risk of syndrome X.

7.11.5. Keeping in view the substantial prevalence of syndrome X among middle aged army personnel as observed in this study (8.47%) as well as the fact that Indian army personnel represent the national population at large, it is recommended that community based field epidemiological studies on syndrome X may be undertaken among the general population in our country.

7.12. Thus, the present study, possibly being the first of its kind in our country to have had addressed the issue of syndrome X, has given clear indication that syndrome X is not a myth but a definite reality of sufficient magnitude in the middle aged population of our army. The study has forwarded a clear definition of syndrome X, the interaction of its constituent factors, the various risk factors for this syndrome, and the risk which this syndrome carries for IHD. A preventive strategy has been suggested, based on the findings of this study.