## Initial Drug Resistance Pattern in New Cases of Pulmonary Tuberculosis

Sir,

Tuberculosis remains as one of the main public health problems in India. Multidrug resistant Tuberculosis (MDR-TB) is becoming a major health problem at a global level with an increasing HIV/AIDS scenario. It is estimated that 28% of the world's TB cases are in India. The rate of MDR-TB in India is very low and ranges from 0-6%. Primary MDR-TB is found to be ≤ 3.2%.[1] Studies from India have reported HIV seropositivity rates in patients with TB ranging from 0.4 to 20.1%.[2] The prevalence of drug resistant tuberculosis varies considerably throughout the world. The true assessment of drug resistance is limited by inadequate culture and drug sensitivity facilities.

We analyzed the susceptibility of *Mycobacterium tuberculosis* to antituberculous drugs among 35 sputum isolates of new cases of pulmonary tuberculosis in adults who were HIV negative from SDS sanatorium. These cases were sputum smear positive for acid fast bacilli and chest X-ray suggestive of pulmonary tuberculosis. Patients with past history of tuberculosis and any other chronic pulmonary illness were excluded.

*Mycobacterium tuberculosis* was isolated and drug susceptibility testing was carried out for the primary line of drugs - Streptomycin, Isoniazid, Rifampicin and Ethambutol using the modified proportion method in the BACTEC 460TB Radiometric system (Middlebrook 7H12 medium). Of the 35 isolates tested, mono resistance to Isoniazid was found in three cases and one case showed mono resistance to Rifampicin. None of the isolates was multidrug resistant (Isoniazid and Rifampicin). All the 35 cases were negative for HIV antibodies tested as per NACO guidelines.

The global median prevalence of MDR TB in new cases is 1.1% (range 0-14.2%). The worldwide range of drug resistance to Isoniazid, Streptomycin, Rifampicin and Ethambutol is established to be 0-42.6%, 0-51.5%), 0-15.6%, 0-24.8% respectively according to the global project on drug resistance,[3] whereas, in India, the rate of Primary MDR-TB is found to be ≤ 3.2%. The levels of primary resistance to isoniazid, streptomycin, rifampicin and ethambutol as single agents range from 0-16%, 0.1-23.5%, 0-3% and 0-4.2% respectively.[1]

Controlled clinical trials conducted by the Tuberculosis Research Centre, Chennai, on the prevalence of drug resistance over the last three decades have revealed a resistant range of 10-16% for Isoniazid and 8-13% for streptomycin with MDR seen in < 1% or 1% of the cases.[3]

Studies on drug resistance conducted by National Tuberculosis Institute, Bangalore, showed MDR TB levels to be 2.2% (in Bangalore) amongst patients with no history of previous treatment (Unpublished data from NTI).[3]

Other reports have also found that drug resistant tuberculosis including MDR TB is no longer common among people infected with HIV.[2]

We report 8.5% of primary drug resistance to isoniazid which is well within the range reported throughout the world. Primary resistance to rifampicin (2.8%) falls in the lower category of the global range.

This indicates that MDR TB is probably not a major problem among new cases of pulmonary tuberculosis among HIV seronegative individuals. Surveillance on a larger scale on drug resistance pattern of *M. tuberculosis* will enable to maintain a data bank which will probably contribute to the success of RNTCP.

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## Is Waist to Height Ratio a Better and More Practical Measure of Obesity to Assess Cardiovascular or Diabetes risk in Indians?

Sir,

In response to the editorial by V Mohan and M Deepa.[1] I would like to point another measure of obesity appropriate to Indians. It has been rightly pointed that Indians have higher abdominal adiposity, measured as the waist-to-hip ratio or waist circumference, although they have lean body mass. However measuring hip circumference in community settings (or even in clinic situation) is difficult due to cultural reasons. Further when measured in fully clothed subjects, it will be inaccurate. We, therefore, explored if height was a good surrogate for hip measurement in a cross-sectional survey led by KS Reddy, which was carried out among a stratified random sample of industrial employees and their family members (10930 individuals, mean age 39.6 years, men: 6764) employed in eleven medium to-large industries located at eleven diverse sites in India.[2] Waist circumference to height ratio (WC-HR) was calculated by dividing waist circumference (expressed in centimeters) with height (expressed in centimeters). We found that waist to height ratio (WC-HR) had a higher predictive power for diabetes than waist circumference and BMI and there was a better continuous relationship for WC-HR as compared to waist circumference or BMI. Similar superior predictive value was demonstrated with ROC curves for WC-HR, with a higher area under the curve showing a better predictive value for diabetes associated with it. Hence we believe that risk scores based on WC-HR for predicting diabetes or cardiovascular risk could be an alternate and more practical method compared to other measures of obesity in Indians. Parikh *et al*[3] reported a novel index of central obesity that was based on measurement of waist size and body height to predict cardiovascular risk. Recent reports from Asian populations in Iran[4] and Bangladesh[5] have demonstrated that among obesity measurements, WC-HR has the best predictive value for diabetes as compared to BMI and WC. Similar to our study the Iranian study employed ROC curve analysis which showed a higher area under ROC curve for WC-HR.

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## Reply to the Author

Sir,

There are multiple measures of obesity.[1] These range from time tested measures such as weight and body mass index to more complex clinical measures that determine regional distribution of fat such as subscapular skin-fold thickness, multi-site skin fold thickness, arm or thigh thickness, and abdominal girth. After the recognition that intra-abdominal fat was metabolically active and a major predictor of cardiovascular risk, multiple measures for its determination have evolved. These include measurement of waist circumference, waist length, sagittal waist diameter, waist-hip ratio, waist-height ratio, waist circumference-waist length ratio, and others.[2] Some of these measures have been tested in prospective epidemiological studies and waist circumference has been reported to be the most significant positive predictor of cardiovascular risk factors and cardiovascular events.[3] The gold standard of measurement of adiposity remains measurement of double-labeled water using radioactive techniques and dual-energy X-ray absorptiometry (DEXA) scan.[2] Regional distribution can be measured using either the DEXA, computed tomography or magnetic resonance imaging scans.[2] Each of these techniques have their pros and cons and the clinical use for determining cardiovascular risk depends on their positive or negative predictive value.[3]

Our article reported that obesity measured by either a high body mass index, waist size or waist-hip ratio are equal in predicting cardiovascular risk.[4] In the accompanying editorial Mohan *et al*[5] have opined that measurement of waist-size is a simple and reliable estimate of cardiovascular risk although multiple arguments could be placed in favor or against this simple yet technically demanding measure. The INTERHEART study[6] reported that elevated waist-hip ratio was an important predictor of acute myocardial infarction and high waist-size as well as low hip-size were significant predictors of risk. Parikh *et al*[7] reported a novel index of central obesity that was based on measurement of waist size and body height to predict cardiovascular risk. Joshi[8] suggests that waist-height ratio is a useful measure of intra-abdominal adiposity. To establish this hypothesis data from the national non-communicable disease risk factor surveillance are presented that clearly show that high waist-height ratio predicts cardiovascular risk. Multiple studies from other countries have evaluated importance of waist-height ratio and a British Study succinctly concludes that waist circumference should be less than half of height for preventing cardiovascular risk.[9]

We determined the role of waist-height ratio in prediction of cardiovascular risk in the same cohort reported in the *JAPI* article[4] (Table 1). Mean waist-height ratio in men was 0.54 ± 0.09 and in women was 0.55 ± 0.09. Quartiles of waist-hip ratios were generated and prevalence of cardiovascular risk factors determined in each group. In both men and women in the study cohort there is a significantly escalating trends in prevalence of cardiovascular risk factors- hypertension, lipid abnormalities, diabetes and the metabolic syndrome- with increasing waist-height ratio. These trends are essentially similar to those reported with body mass index, waist size or waist hip ratio.[4] We conclude that the waist-height ratio is similar in predictive capacity to the measures reported in the article.[4] However, these and

**Table 1 : Waist-height ratio and cardiovascular risk factors in urban subjects**

| Risk Factors | Waist-Height Ratio Quartiles | | | | |
|---|---|---|---|---|---|
| | First | Second | Third | Fourth | P for trend |
| **Men (n=532)** | 133 | 133 | 133 | 133 | |
| Smoking | 63 (47.4) | 56 (42.1) | 42 (31.6) | 39 (29.3) | 0.001 |
| Hypertension | 13 (9.8) | 39 (29.3) | 63 (47.4) | 82 (61.6) | 0.000 |
| High cholesterol ≥ 200 mg/dl | 34 (25.6) | 55 (41.4) | 61 (45.9) | 49 (36.8) | 0.041 |
| Low HDL <40 mg/dl | 52 (39.1) | 77 (57.9) | 81 (60.9) | 82 (61.6) | 0.000 |
| High triglycerides ≥ 150 mg/dl | 27 (20.3) | 44 (33.1) | 56 (42.1) | 45 (33.8) | 0.006 |
| Diabetes | 3 (2.3) | 15 (11.3) | 24 (18.0) | 28 (21.1) | 0.000 |
| Metabolic syndrome | 3 (2.3) | 15 (11.3) | 32 (24.0) | 72 (54.1) | 0.000 |
| **Women (n=559)** | 139 | 141 | 139 | 140 | |
| Smoking | 22 (15.8) | 18 (12.8) | 11 (7.9) | 14 (10.0) | 0.066 |
| Hypertension | 7 (5.0) | 50 (35.5) | 65 (46.8) | 88 (62.9) | 0.000 |
| High cholesterol ≥ 200 mg/dl | 38 (27.3) | 60 (43.5) | 73 (52.5) | 70 (50.0) | 0.000 |
| Low HDL <50 mg/dl | 115 (82.7) | 129 (91.5) | 127 (91.4) | 133 (95.0) | 0.001 |
| High triglycerides ≥ 150 mg/dl | 27 (19.4) | 49 (34.8) | 46 (33.1) | 38 (27.1) | 0.214 |
| Diabetes | 2 (1.4) | 10 (7.1) | 18 (12.9) | 34 (24.3) | 0.000 |
| Metabolic syndrome | 7 (5.0) | 17 (12.1) | 60 (43.2) | 94 (67.1) | 0.000 |

Numbers in parentheses are percent.

some other studies from India[10] that report on adiposity-cardiovascular risk associations are essentially cross-sectional studies and the definitive pathophysiological role of an individual measure of obesity or intra-abdominal obesity can be determined only by long-term prospective studies. The jury is still open.

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