# ASSOCIATION OF GLYCEMIC CONTROL WITH RADIOLOGICAL CONVERSION AMONG DIABETIC TUBERCULOSIS PATIENTS UNDER ANTITUBERCULAR TREATMENT

**Liaquat Ali[1]**, Jannatul Nayeem[1], Nowrin Afroze[2], Hasina Akhter Chowdhury[1]

[1]*Pothikrit Institute of Health Studies (PIHS);* [2]*Bangladesh University of Health Sciences (BUHS)*

*e-mail: liaquat@pihs.ac.bd, liaquat304@gmail.com*

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## Background

- Patients with diabetes mellitus (DM) develop tuberculosis (TB) approximately three times more compared to their nondiabetic counterparts [1]. Radiological conversion is commonly used as a marker for the efficacy of antitubercular treatment.

- However, it has still not been investigated how glycemic control in diabetic TB patients affect the radiological conversion during antitubercular treatment [2].

## Aim

- The present study was undertaken to assess the proportion of radiological conversion at different periods of follow-up in TB patients with DM under antitubercular treatment and to find out the association of MT conversion with level of glycemic control at various time points.

## Methods

- The study was conducted among TB with DM patients who were enrolled in a DOTS Center program in Dhaka City. For known diabetic patients, fasting (FSG) and 2 hours after breakfast blood glucose (PPG) were measured.

- Plasma glucose was measured by enzymatic method. All participants were examined by Chest X-ray.

- At the end of month 2, 5, and 6 months after the start of Anti-TB treatment, a blood specimen for HbA1c were collected to follow up the prognosis. Statistical analysis was done by appropriate tests.

## Results & Discussion

- At 2 months after initiation of systematic treatment the FSG values of the X-ray positive subjects did not differ significantly from of the X-ray negative subjects. The HbA1c levels were also not significantly different between two groups (Table-1).

- At 5 months of initiation of systematic treatment, no significant difference on the serum glucose values (FSG: 8.9 (4-38) vs 9.5 (4-30); PPG: 15.0 (5-43) vs 13.1 (0-41) were observed between X-ray+ and X-ray- groups. However, the HbA1c levels were significantly higher among the X-ray+ as compared to X-ray- subjects [9.0 (4.7-16) vs 7.9 (5-15.2); p=0.002] (Table-1).

**Table 1:** Glycemic status of radiologically positive and negative cases at 2 & 5 months

| Xray Conversion | FSG (mmol/l) | PPG (mmol/l) | HbA1C (%) |
|---|---|---|---|
| **Glycemic Status at 2 months** | | | |
| Positive | 10.9 (4-34) | 16.1 (5-43) | 9.6 (4.5-19.6) |
| Negative | 10.3 (4-26) | 14.6 (4-33) | 9.2 (5-15.2) |
| U/p | 8884.0/0.45 | 8600.5/0.23 | 8478.5/0.17 |
| **Glycemic Status at 5 months** | | | |
| Positive | 8.9 (4-38) | 15.0 (5-43) | 9.0 (4.7-16) |
| Negative | 9.5 (4-30) | 13.1 (0-41) | 7.9 (5-15.2) |
| U/p | 7775.5/0.95 | 6578.5/0.39 | 6003.5/0.002 |

*Results were expressed as median (range), comparison done by Mann-Whitney U test, significant at p-value <0.05, FSG: Fasting serum glucose; PPG: Postprandial glucose;*

- Binary logistic regression analysis (with adjustment of confounding variables) revealed that X-ray nonconversion has a tendency of association with FSG; however the p value (0.097) was outside the limit of significance. X-ray nonconversion had no significant association with PPG at 2 months of treatment; however, the phenomenon showed significant association with HbA1c at this period.

**Table 2:** Association of radiological conversion with FSG, PPG & HbA1c at 2 month by Binary logistic regression analysis on adjusting confounding variables

| Variables | ß | p -Value | Wald | Odds Ratio (OR) |
|---|---|---|---|---|
| **FSG** | | | | |
| Age | 0.009 | 0.40 | 0.681 | 1.009 |
| Gender (Male) | 0.053 | 0.85 | 0.035 | 1.054 |
| Smoker (yes) | -1.305 | 0.01 | 6.715 | 0.271 |
| BMI | -0.009 | 0.46 | 0.532 | 0.991 |
| Month_2_FSG | 0.042 | 0.09 | 2.757 | 1.043 |
| Constant | -0.306 | 0.73 | 0.118 | 0.736 |
| **PPG** | | | | |
| Age | 0.008 | 0.46 | .529 | 1.008 |
| Gender (Male) | 0.019 | 0.94 | .005 | 1.019 |
| Smoker (yes) | -1.266 | 0.01 | 6.416 | 0.282 |
| BMI | -0.010 | 0.44 | .590 | 0.990 |
| Month_2_PPG | 0.028 | 0.12 | 2.351 | 1.029 |
| Constant | -0.177 | 0.83 | .041 | 0.838 |
| **HbA1c** | | | | |
| Age | 0.008 | 0.47 | 0.505 | 1.008 |
| Gender (Male) | 0.029 | 0.91 | 0.010 | 1.029 |
| Smoker (yes) | -1.293 | 0.01 | 6.622 | 0.274 |
| BMI | -0.010 | 0.42 | 0.634 | 0.990 |
| Month_2_HbA1c | 0.098 | 0.04 | 3.914 | 1.102 |
| Constant | -0.643 | 0.49 | 0.466 | 0.526 |

*Reference group, β for standardized regression coefficient, significant at p-value <0.05, level of confidence interval 95%*

- At 5 months after initiation of treatment X-ray nonconversion had no significant association (after adjustment of confounding variables) with FSG; however it showed significant (p= 0.023) association with PPG and specially, it showed highly significant association with HbA1c.

**Table 3:** Association of radiological conversion with FSG, PPG & HbA1c at 5 month by Binary logistic regression analysis on adjusting confounding variables

| Variables | ß | p-Value | Wald | Odds Ratio (OR) |
|---|---|---|---|---|
| **FSG values** | | | | |
| Age | 0.006 | 0.58 | 0.302 | 1.006 |
| Gender (Male) | 0.009 | 0.97 | 0.001 | 1.009 |
| Smoker (yes) | -2.233 | 0.03 | 4.639 | 0.107 |
| BMI | -0.035 | 0.01 | 6.278 | 0.966 |
| Month_5_FSG | 0.028 | 0.37 | 0.800 | 1.028 |
| Constant | 0.494 | 0.61 | 0.258 | 1.640 |
| **PPG values** | | | | |
| Age | 0.005 | 0.65 | 0.200 | 1.005 |
| Gender (Male) | 0.025 | 0.93 | 0.007 | 1.026 |
| Smoker (yes) | -2.226 | 0.03 | 4.608 | 0.108 |
| BMI | -0.033 | 0.01 | 5.566 | 0.968 |
| Month_5_PPG | 0.055 | 0.02 | 5.146 | 1.056 |
| **HbA1c values** | | | | |
| Age | 0.006 | 0.63 | 0.222 | 1.006 |
| Gender (Male) | 0.070 | 0.82 | 0.049 | 1.072 |
| Smoker (yes) | -2.271 | 0.02 | 4.778 | 0.103 |
| BMI | -0.036 | 0.01 | 6.451 | 0.965 |
| Month_5_HbA1c | 0.207 | 0.001 | 11.097 | 1.230 |
| Constant | -0.992 | 0.34 | 0.898 | 0.371 |

*Reference group, β for standardized regression coefficient, significant at p-value <0.05, level of confidence interval 95%*

- The radiological resolution of the disease markedly improved at 5 months (70.4% negative), but it was still far below the bacteriological resolution (91.5%) of the disease. At 2 months of treatment only about half of the patients became chest X-ray negative.

### Conclusions

- Radiology alone may give a false notion regarding the active disease and a correct bacteriological diagnosis is a prerequisite for rational treatment in these cases. From the data it seems that diabetes control affects the radiological remission of the TB specially at the later stages of treatment.

- One coincidental finding in the present study was the consistent association of smoking with radiological (but not bacteriological) conversion in the TB-DM patients both at 2 and 5 months of treatment. The importance of this risk factor in the occurrence of TB is well known, but the present study reveals that the treatment outcome of the disease may be significantly associated with smoking habit of the subjects.

### Reference

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