A Study of Relation Between Meals and Body Temperature in Patients of *Diqqe Rewi* (Pulmonary Tuberculosis)

[1]*Akhter Hussain Jamali,
[2]M. Zulkifle and
[3]A.H. Ansari

[1]Regional Research Institute of Unani Medicine (CCRUM), Bhadrak – 756100, Odisha

[2]Department of Kulliyat
[3]Department of Tahaffuzi-wa-Samaji Tib, National Institute of Unani Medicine, Kottigepalaya, Magadi Main Road, Bangalore - 560091

Abstract

Tuberculosis is a specific infectious disease caused by *Mycobacterium tuberculosis.* Despite the modern facilities, the sufferers are investing month-long duration in shopping for diagnosis. The best control measures are early detection and prompt treatment. Keeping in view the above considerations, the study was conducted. It was non-randomized control study in which diagnosed patients of pulmonary tuberculosis were taken from D.O.T.S. centre, N.I.U.M. Hospital, Bangalore and 50 healthy volunteers were taken for comparison. Temperature of both the groups was recorded before and after 1, 2 and 3 hours after meals for 1 week. It was found that at night inter group mean differences before and after 1, 2 and 3 hours of meals were found to be 0.642 °F, 1.114°F, 1.354 °F and 1.512 °F respectively. Elevation of temperature for more than three hours after meal coincides with the statement of Unani physician. It may be used as a diagnostic tool to detect the pulmonary tuberculosis.

Key Words: Tuberculosis, Diagnosis, Body Temperature, Unani Medicine.

Introduction

Diq is one of the oldest diseases known to human beings (Armstrong,1999). It is a chronic specific infectious disease caused by bacillus known as *Mycobacterium tuberculosis* (Park, 2007). The bacilli predominantly attacks lungs and cause pulmonary tuberculosis, which constitutes about 70% of active tuberculosis cases. The remaining 30% of active tuberculosis is extra pulmonary, which can affect lymph nodes, tissue surrounding the lungs and heart, meninges, kidneys, fallopian tubes, bones and joints, ears, throat and skin. Although tuberculosis can infect other organs in the body, the lungs are the organs, frequently attacked by the bacteria, which is characterized by a chronic cough, significant weight loss, loss of appetite, evening rise temperature, night sweat, chest pain and shortness of breath (Andreoli, 2004; Shah, 2003; Hunter, 2004).

When *Hararat Ghariba* dries the *Rutoobat Gharizia*, it results into *Diq.* In patients of *Diq* temperature is low grade and intermittent. On taking meal, fever rises till the completion of *Hazm Salis* (third digestion) or *Hazm Rabe'* (fourth digestion) (Ibn Zohar, 1986; Tabri, 2002; Majoosi, 1889). Pulse of tuberculosis patients is *zaeef* (weak) and *sulb* (hard) (Tabri, 2002) and *zanbulfar* (like tail of rat) i.e. irregularly irregular (Ibn Sina, 2007). Temperature is the gradient of

[1]* Author for correspondence

pulse rate, on increasing 1º Fahrenheit there is increase in 10 beats per minute (18 beats per degree Celsius)(Guyton, *et al.,* 2006).

Because of limitations in case finding with existing screening tools, there is need to evaluate a new method. Moreover, present screening tools, especially sputum examination for acid fast bacilli may yield false positive or false negative results, whatever may be the reason. The case detection is not as simple as it should be for successful screening. Diagnosis has always been on rational and pathology based. Unani system of medicine is excellent in this field, every Unani physician has emphasized for correct diagnosis before starting the treatment and their diagnosis is evidence based as well as explained on pathological background. In case of *Diq* they have mentioned that when *Rutoobaate Badan* (body fluids) especially that of *Aazae Aslia* become depleted, every type of diet results in elevation of temperature during third/fourth stage of digestion and this temperature elevation is described as definite sign of *Diq* (Ibn Sina,2007; Jurjani,1996). So for screening purpose this parameter can be used even by a layman in suspected cases after its validation.

Materials and Methods

The present study entitled as “A study of relation in between meals and body temperature in patients of *Diqqe Rewi* (pulmonary tuberculosis)” was conducted to evaluate the relation between meal and elevation of body temperature and to find a safe and economic diagnostic tool for provisional diagnosis of *Diqqe Rewi.* It was non-randomized case control study. The patients were enrolled from D.O.T.S. centre, National Institute of Unani Medicine, Bangalore. Before starting the study, an ethical clearance was obtained from Institutional Ethical Committee. After that, this physiological study was started by enrolling eligible patients in test and healthy volunteers in control groups and temperature of both the groups was recorded before and after 1, 2 and 3 hours after meals for 1 week. The study was a non-randomized control trail with sample size of 50 patients in test and 50 healthy volunteers in control groups. The duration of study was 1 year.

Criteria for Selection of Cases

Inclusion Criteria

- Diagnosed cases of pulmonary tuberculosis of all the three stages of either sex of age group 15-60 years on anti-tubercular treatment not for more than 1 month.

Exclusion Criteria

- Patients with malignant disease in lungs
- Patients with extra pulmonary tuberculosis
- Patients of pulmonary tuberculosis taking anti-tubercular treatment for more than 1 month

Selection of Subjects

Already diagnosed patients were selected from the directly observed treatment, short course chemotherapy (D.O.T.S.) Centre, I.P.D. of National Institute of Unani Medicine (NIUM), Bangalore. The diagnosed patients, if fulfilled all the terms of inclusion criteria, were selected for the study. Similarly healthy volunteers from NIUM Campus were selected as control group.

Investigation

The patients included in this study were already diagnosed by sputum for acid fast bacilli (AFB) examination supplemented with X-ray of chest wherever necessary.

Informed Consent

Patients and healthy volunteers, who fulfilled the inclusion criteria were given the information sheet mentioning details regarding the study, they were given the opportunity to ask any question. If they agreed then they were asked to sign on consent form.

Method of Temperature Recording

The sterilized digital thermometer was used to record the oral temperature of the patients. For good results, the patients were asked to keep the mouth closed for 5 minutes before recording. It was kept in mouth under tongue till the beep sound was heard.

Method of Sterilization of Thermometer

It was sterilized keeping it in solution of 5 ml savlon and 10 ml water for 12 hours. For every patient and healthy volunteers separate thermometer was used. Every time before and after application, it was washed in running water and then wiped with sterilized cotton.

Schedule of Temperature Recording of Test Case Group

Patients were given meal at different times and temperature was recorded before meal and after 1, 2 and 3 hours of meal. They were not allowed hot drinks/meals during the study period.

Schedule of Temperature Recording of Control Group

By the same method, temperature of control group was recorded.

Statistical Analysis

The difference in temperature of the patients and healthy volunteers before and after 1, 2 and 3 hours of meal was subjected to statistical analysis to observe the significance of observed difference. Unani physicians claimed the difference as pathognomically diagnostic. The difference in mean of the body temperature of Test Group and Control was analyzed by paired 't' test, using instant graph pad at 5% level of significance ($p<0.05$).

Results and Discussion

According to thermodynamics, human beings are open system isothermal machine that works in non-equilibrium in which both matter and energy are exchanged (Roy, 1999). Human calorimetry is unique because of its endothermic nature (Ganong, 1986). *Tabiyat* is the supreme controller of all the body functions (Kabeeruddin, 2007). *Quwat Mudabbirae Badan* has been bestowed by such power that up to certain limitations, can control and coordinate the body functions. When these limitations are crossed, *Tabiyat* is unable to control the functions, the *Mizaj* of person becomes *Sue*. Due to *Mizaji* obligations, deviations in *Mizaj* (*Sue Mizaj*) results in functional abnormalities and consequently structural deformities result (Zaidi *et al*.,1999). In *Diqqe Rewi,* fluids are dried up due to *Asbab Sabiqa* and *Badia*. This results into functional and structural deformities. Due to persistence of *Sue Mizaj Har* in the organs, the food reaching there shows the *Mizaji* resemblance and organ gains *Hararat Ghariba* from this food. Hence, body temperature elevates and remains elevated up to three hours (Ibn Rushd, 1987).

Right diagnosis is the most effective and valuable asset of journey while travelling in the entangled valley of treatment. For tuberculosis, early detection is the most effective mode of intervention.

The present study was conducted to evaluate the relationship between meals and body temperature and to find out a safe, simple, cheap and cost effective

method of diagnosis for pulmonary tuberculosis cases. It was non-randomized control study in which 50 diagnosed patients and 50 healthy volunteers were selected and temperature of the both groups was recorded before and after 1, 2 and 3 hr of meals for seven days in morning, afternoon and at night. The data of inter group were statistically analyzed by paired 't' test.

It was found that in healthy controls rise in temperature was not found more than 0.10 °F after three hours of meals but in Test Group, it was found to be 0.6 °F to 1.0 °F. Mean temperature of Test patients and healthy volunteers before and 1, 2 and 3 hr after meal were significantly different with p-value <0.0001 except in the morning, before meal, the mean difference was with p-value >0.05 which is not considered significant. This significant difference may be due to persistence of *Sue Mizaj Har* in the organs, the food reaching there shows the *Mizaji* resemblance and organ gains *Hararat Ghariba* from this food. Hence body temperature elevates and remains elevated up to three hours. It was found that mean temperature increases in correspondence to pulse rate.

Table 1 : Mean Differences between Test Group and Control Group in Morning

(n = 100)

Mean Difference between	Test Group (n = 50)	P value	Control (n = 50)	P Value
TBM (temperature before meal) and 1 Hr AM (after meal) in °F	0.680	P<0.001	0.156	P<0.001
TBM (temperature before meal) and 2 Hr AM (after meal) in °F	0.952	P<0.001	0.1840	P<0.001
TBM (temperature before meal) and 3 Hr AM (after meal) in °F	0.848	P<0.001	0.052	p>0.05

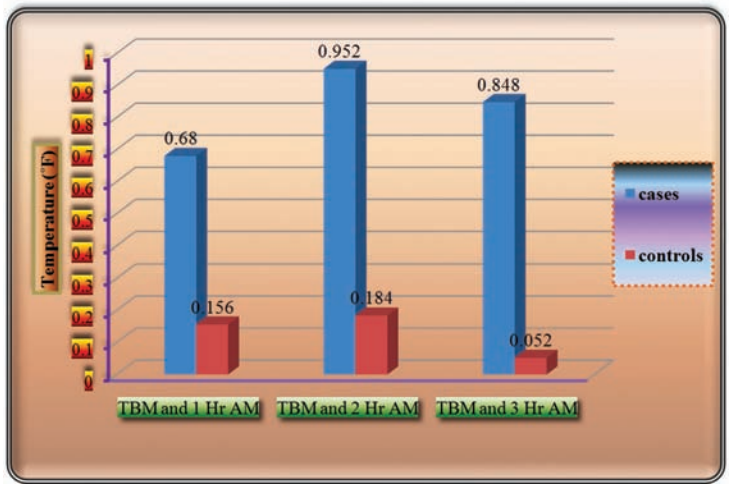

Fig. 1 : Mean Differences between Test Group and Control Group in Morning

Table 2 : Mean Differences between Test Group and Control Group in Afternoon

(n = 100)

Mean Difference between	Test Group (n = 50)	P value	Control (n = 50)	P Value
TBM (temperature before meal) and 1 Hr AM (after meal) in °F	0.612	P<0.001	0.21	P<0.001
TBM (temperature before meal) and 2 Hr AM (after meal) in °F	0.956	P<0.001	0.144	P<0.01
TBM (temperature before meal) and 3 Hr AM (after meal) in °F	0.784	P<0.001	0.086	p>0.05

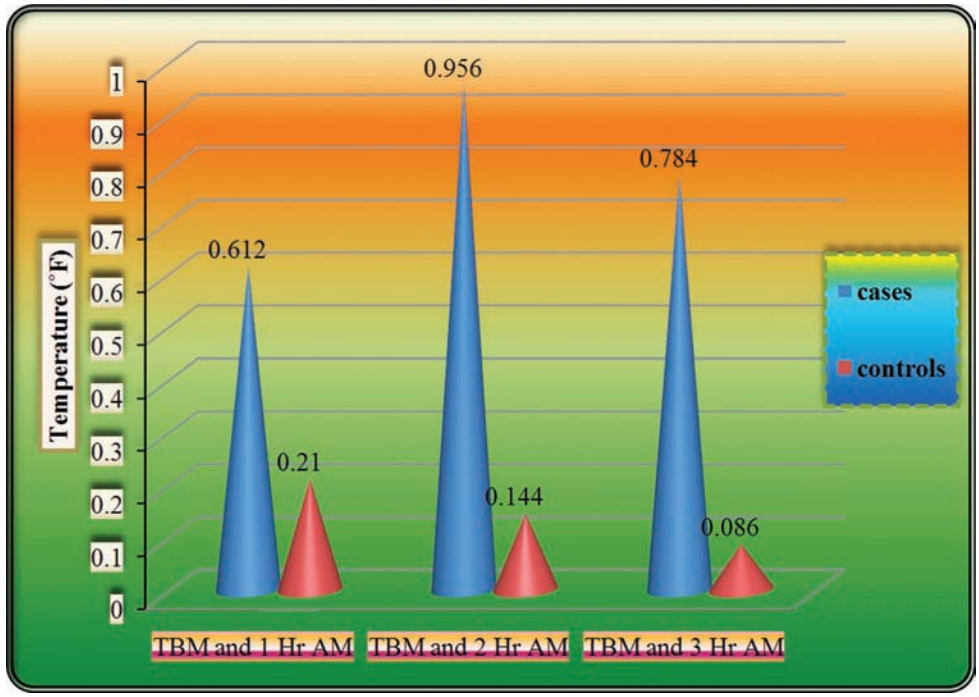

Fig. 2 : Mean Differences between Test Group and Control Group in Afternoon

Table 3 : Mean Differences between Test Group and Control Group at Night

(n = 100)

Mean Difference Between	Test Group (n = 50)	P value	Control (n = 50)	P Value
TBM(temperature before meal) and 1 Hr AM (after meal) in °F	0.684	P<0.001	0.2140	P<0.001
TBM(temperature before meal) and 2 Hr AM (after meal) in °F	0.96	P<0.001	0.2480	P<0.001
TBM (temperature before meal) and 3 Hr AM (after meal) in °F	0.856	P<0.001	0.0140	p>0.05

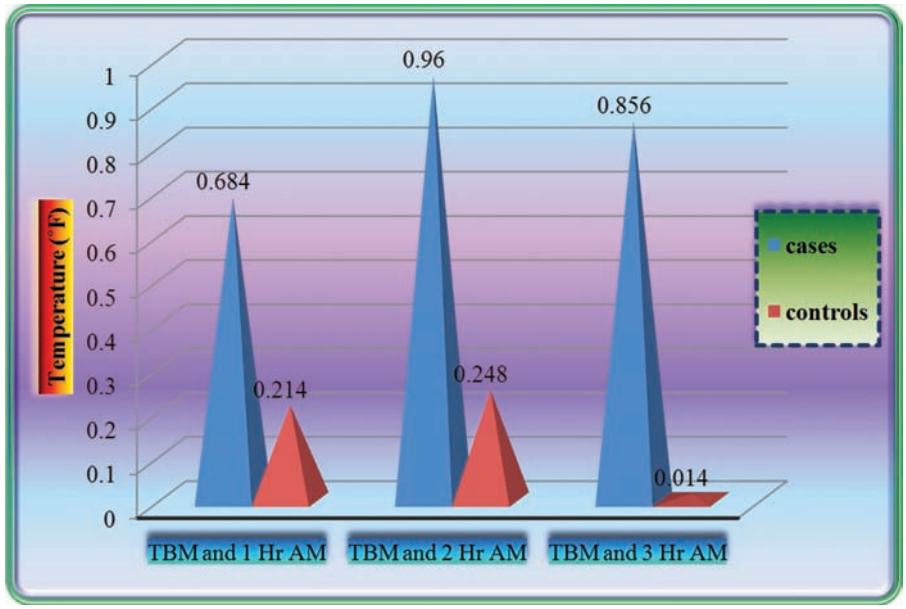

Fig. 3 : Mean Differences between Test Group and Control Group at Night

Table 4 : Mean Temperature of Test Group and Control Group in Morning

(n = 100)

Mean Temperature in °F	Test Group (n = 50)	Control (n = 50)	Mean difference	p-value
BM (Before meal)	98.33	98.004	0.3260	>0.05
1Hr AM (after meal)	99.010	98.16	0.850	<0.0001
2Hr AM (after meal)	99.282	98.188	1.094	<0.0001
3Hr AM (after meal)	99.178	98.056	1.122	<0.0001

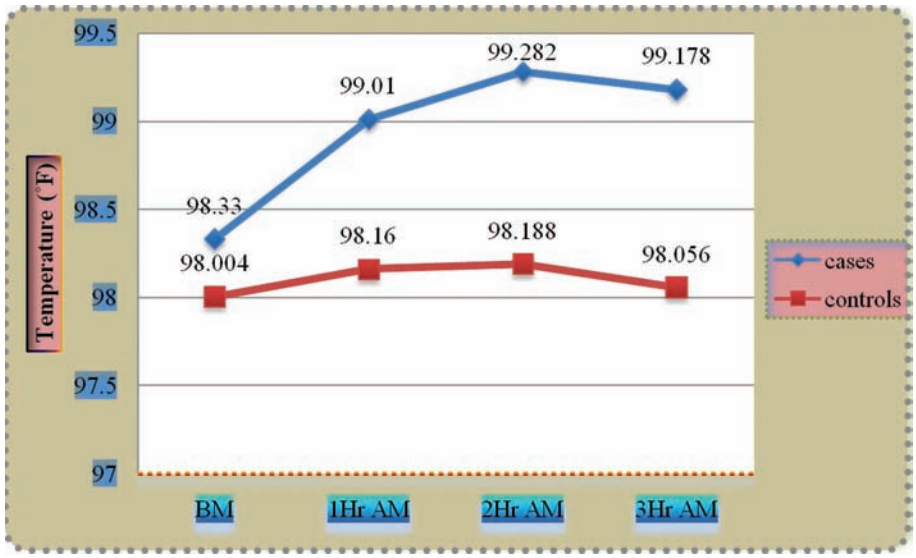

Fig. 4 : Mean Temperature of Test Group and Control Group in Morning

Table 5 : Mean Temperature of Test Group and Control Goup in Afternoon

(n = 100)

Mean Temperature in °F	Test Group (n = 50)	Control (n = 50)	Mean difference	p-value
BM (Before meal)	98.698	98.254	0.6940	<0.0001
1Hr AM (after meal)	99.310	98.464	0.8460	<0.0001
2Hr AM (after meal)	99.654	98.398	1.256	<0.0001
3Hr AM (after meal)	99.482	98.168	1.314	<0.0001

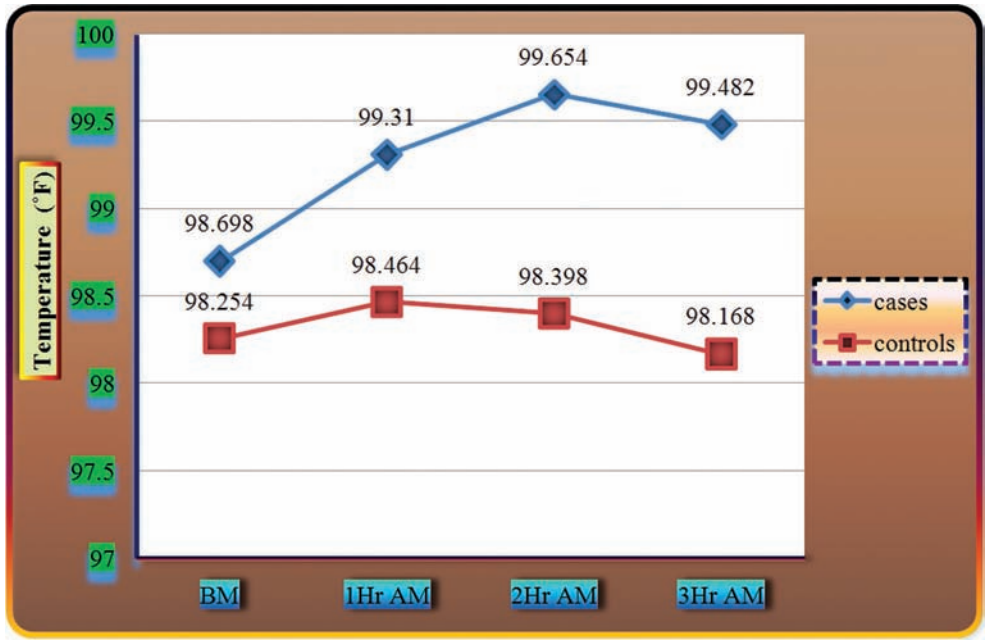

Fig. 5 : Mean Temperature of Test Group and Control Goup in Afternoon

Table 6 : Mean Temperature of Test Group and Control Group at Night

(n = 100)

Mean Temperature in °F	Test Group (n = 50)	Control (n = 50)	Mean difference	p-value
BM (Before meal)	98.918	98.276	0.6420	<0.0001
1Hr AM (after meal)	99.602	98.49	1.114	<0.0001
2Hr AM (after meal)	99.878	98.524	1.354	<0.0001
3Hr AM (after meal)	99.774	98.262	1.512	<0.0001

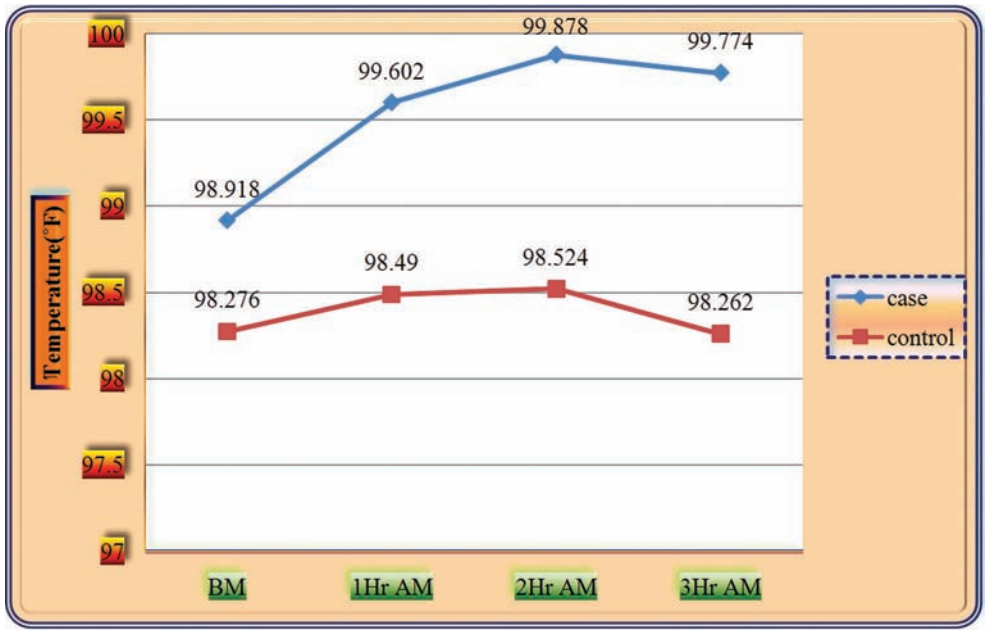

Fig. 6 : Mean Temperature of Test Group and Control Group at Night

Table 7 : Mean Temperature and Mean Pulse Rate of Test Group and Control Group in Afternoon (n = 100)

	Mean Temperature of Test Groupin °F (n = 50)	Mean Pulse Rate per minute of Test Group	Mean Temperature Control in °F (n = 50)	Mean Pulse Rate per minute of Control
BM (Before meal)	98.698	79.26	98.254	71.84
1Hr AM (after meal)	99.310	86.6	98.464	74.22
2Hr AM (after meal)	99.654	91	98.398	73.02
3Hr AM (after meal)	99.482	87.94	98.168	68.56

Conclusion

In the light of above results and observations, it may concluded that rise in temperature from 0.60 °F to 1.0 °F with symptoms may be suggestive of pulmonary tuberculosis. Elevation of body temperature after meals should be considered as a diagnostic tool for provisional diagnosis of the disease. It will help to detect the cases in the field as well as to diagnose the individual in the clinic to know both the hidden and apparent part of the iceberg of disease. Its importance is like to stamp out the spark rather than calling the fire brigade to put out the fire caused by it.

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