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## Editorial

Institute of Public Health, Lahore is a premier teaching organization which is working to train health personnel in order to build their capacity to manage health services in Pakistan. Our postgraduate programs are designed to impart knowledge and skills for improving the health status of our communities. In continuation of this endeavor, postgraduate courses of MPH, MMCH, MHM and M.Phil (Community Medicine) have been launched for the last many years, affiliated with University of Health Sciences, Lahore. Institute of Public Health is one of the recognized centers for imparting training in MCPS & FCPS Part II (Community Medicine).

IPH has the potential to grow into a center of excellence in teaching and training in public health in the country, in future. The immense potential that it possesses, both in terms of human resource and academics, is commendable. The institute not only has to cope with the challenge of providing the managerial skills and programmatic approach to health care and health systems in Punjab but also leads the other public health institutes in the other provinces of country.

Public health is growing fast and becoming a challenge which the world is facing in terms of the health indicators formulation and the newer health dimensions which are being introduced in public health have to be addressed presently and in the future also.

The research culture is of supreme importance in any field of health. It does not exist in Pakistan because of lack of health personnel training and scarcity of resources for conduction of research which is very unfortunate. In this regard, cooperation of the NGO's like WHO, UNICEF etc may be sought for financial support.

Institute of Public Health has re-launched Pakistan Journal of Health which is probably the oldest of all research journals pertaining to health in this country. The journal was being printed regularly up to 2005. Due to certain unavoidable circumstances, the printing was discontinued. Now it is being printed again and will be printed regularly in future Insha Allah. It will cover review articles, original articles, case reports, briefs etc relating to all existing health specialties in addition to specific public health issues.

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## Tissue Doppler Imaging Is An Acceptable Non-Invasive Tool For Diagnosis Of Early Diastolic Dysfunction In Patients With Coronary Artery Disease And Myocardial Infarction

Umar Farooq Dar, Tahir Mahmud, Muhammad Nadeem Tahir, Fahar Adnan, Muhammad Shahid Iqbal and Muhammad Nasir Hamdani

**Objective:** To assess sensitivity and specificity of tissue doppler imaging (TDI) in predicting diastolic dysfunction taking left ventricular end diastolic pressure (LVEDP) measured during angiography as gold standard.

**Material & Methods:** In a cross sectional study, carried out at Punjab Institute of Cardiology, Lahore from 16<sup>th</sup> May to 15<sup>th</sup> November 2013, 150 patients with myocardial infarction and preserved ejection fraction (EF) >60%, were screened by TDI after informed consent using purposive non-probability sampling. Ratio of Early mitral inflow velocity (E wave) to peak early diastolic velocity of mitral annulus (Ea) >10 was labeled having diastolic dysfunction taking LVEDP measured during angiography as gold standard. Patients with LVEDP >15 were diagnosed as having diastolic dysfunction.

**Results:** 150 patients (68.7% male) with mean age 54.7± 7.0 years were included. On TDI, 81 patients (54%) were having E/Ea more than 10 but during angiography 86 patients (57.3%) were found diseased i.e. having diastolic dysfunction. Sensitivity, specificity, positive predictive value and negative predictive value came out to be 77.91%, 78.13%, 82.7% and 72.5% respectively.

**Conclusion:** TDI is an acceptable non-invasive tool for diagnosis of early diastolic dysfunction in patients with coronary ischemia and preserved EF.

**Keywords** Left ventricular end diastolic pressure, Tissue Doppler imaging, Diastolic heart failure, Myocardial infarction

### Introduction:

Left ventricular failure after acute myocardial infarction leads to high morbidity and mortality.<sup>1</sup> Early identification of high-risk subjects with left ventricular dysfunction remains mandatory to prevent heart failure and to improve prognosis. Diastolic dysfunction is common in cardiac disease and contributes to the signs and symptoms of heart failure.<sup>2</sup> After acute myocardial infarction, myocardial ischemia, cell necrosis, micro-vascular dysfunction and regional wall motion abnormalities will influence the rate of active relaxation leading to interstitial edema, thereby causing LV chamber stiffness and diastolic dysfunction. Doppler echo-cardiography is widely used for the non-invasive assessment of systolic and diastolic function of the LV and also the LV filling pressure.<sup>3-5</sup> Analysis of the mitral inflow velocity curve provides useful information for determination of LV filling pressures and prediction of prognosis.<sup>6</sup>

There are several reports about using TDI parameters such as peak early diastolic velocity

of mitral annulus (Ea), peak late diastolic velocity of mitral annulus (Aa), and the ratio E/Ea, to predict left ventricular filling pressure.<sup>7-11</sup> Combining trans-mitral inflow velocity (E/Ea) has been proposed as a better Doppler predictor for evaluating left ventricular filling pressure.<sup>10,11</sup> LVEDP is a surrogate to assess the magnitude of diastolic dysfunction. Studies in the west have assessed the value of a raised E/Ea on TDI in predicting high LVEDP and diastolic dysfunction. Although some studies have shown controversies, such as the cut-off point of E/Ea to predict high LV filling pressure was still uncertain varying between 8-15,<sup>6,12,13,14,15</sup> others have shown convincing results regarding the utility of E/Ea to assess diastolic dysfunction.<sup>12,16,17</sup>

This parameter remains largely un-assessed in our patient population. LV mass and therefore its contractile properties as well as the response to pathologic process varies among various populations. Genetic factors, body mass index, muscle mass and lifestyle, all factors determine the myocardial performance in normal and

diseased patients. These are responsible for the variations in disease response among various races.

### Objective:

The objective of this study was to assess the sensitivity and specificity of a raised E/Ea >10 on Tissue Doppler Imaging in predicting a high LVEDP >15mmHg during cardiac catheterization in Pakistani population.

Assessing the accuracy of TDI to predict diastolic dysfunction in our patients will help us in two ways. Validating the accuracy of TDI will guide us if it is a reliable non-invasive tool to assess diastolic dysfunction and diastolic heart failure as previous literature shows variability in results. By studying this in our population the accuracy of this parameter will be validated as regards to an Asian population.

### Material & Methods:

In this cross sectional study, carried out at Punjab Institute of Cardiology, Lahore from 16<sup>th</sup> May to 15<sup>th</sup> November 2013, 150 patients with acute myocardial infarction who fulfilled the inclusion criteria were included after an informed consent. Inclusion criterion was sinus rhythm and preserved ejection fraction (EF) >60% with age ranging between 20 & 70 years. Myocardial infarction was defined as raised cardiac bio-markers in the presence of ischemic symptoms such as chest pressure or chest pain on exertion with profuse sweating, neck or jaw pain, shortness of breath, new ST segment elevation in two contiguous pre-cordial leads of  $\geq 2\text{mm}$  or  $\geq 1\text{mm}$  in limb leads. Patients with valvular heart disease, complete right/ left bundle branch block, pacemaker dependence and atrial fibrillation and post mitral valve replacement were excluded.

All patients undergoing cardiac catheterization underwent an echocardiographic examination 4 hours prior to the procedure. Ratio of Early mitral inflow velocity (E wave) to peak early diastolic velocity of mitral annulus (Ea) was noted in each patient. An average of three readings was taken. Left Ventricular Early Diastolic Pressure of each patient was noted at cardiac catheterization. The sensitivity and specificity of E/Ea ratio >10 on echo was assessed to predict diastolic dysfunction i.e.

LVEDP >15 on cardiac catheterization. Cardiac catheterization was performed via trans-femoral/ trans-radial route using six (6F) French sheaths. Left ventricular diastolic pressure was directly measured by fluid filled pigtail catheter attached to a pressure transducer. A pre-designed proforma was filled for each case to record the bio-data and study variables. Collected data was analysed using SPSS 17. Categorical variables like gender, E/Ea ratio and LVEDP were expressed as frequencies and percentages and continuous variables like age as means  $\pm$  standard deviations (SD). True positive, true negative, false positive and false negative values were calculated for E/Ea ratio >10 to predict an LVEDP >15mmHg on cardiac catheterization. By using 2x2 tables, measures of diagnostic accuracy for E/Ea like sensitivity, specificity, positive predictive value and negative predictive value were computed using LVEDP on cardiac catheterization as gold standard. Data was stratified for sex to rule out effect of gender.

### Results:

150 patients with mean age  $54.7 \pm 7.0$  years were included in the study. When age was stratified, most of the included patients were found in age range 50 to 60 years (60.7%) while 27% were below 50 and rest were above 60 years of age. 103 patients were male (68.7%) while 47 were female (31.3%). When the patients were screened by tissue Doppler imaging, 81 (54%) were having E/Ea more than 10 i.e. diastolic dysfunction while others showed the opposite. During angiography, when LVEDP was measured, 86 patients (57.3%) were found to have diastolic dysfunction i.e. our standard diagnostic method showed 42.7% patients with preserved ejection fraction having diastolic dysfunction.

A 2x2 table was generated to find out true and false positive and negative and diagnostic validity of tissue Doppler imaging. Sensitivity, specificity, positive predictive value and negative predictive value came out to be 77.91%, 78.13%, 82.7% and 72.5% respectively (**Table 1 & 2**). Data was stratified for gender difference. For male population sensitivity, specificity, positive predictive value and negative predictive value came out to be 83.3%, 72.7%, 80.6% and

76.2% while for female population sensitivity, specificity, positive predictive value and negative predictive value came out to be 70.8%, 82.6%, 80.9% and 73.1% respectively.

## Discussion

Heart failure is a syndrome with increased morbidity and mortality after an acute myocardial infarction.<sup>15</sup> Ejection fraction if decreased needs prompt management regarding the symptomatology of heart failure.<sup>2</sup> In patients with preserved ejection fraction this is not the case. So diastolic heart failure or diastolic dysfunction when diagnosed late leads to remodeling of cardiac tissue and irreparable loss of cardiac function.<sup>4</sup>

There are different diagnostic modalities available regarding diastolic dysfunction but left ventricular end diastolic pressure >15 is taken as gold standard.<sup>17</sup> Due to invasiveness of procedure and as every patient is not an ideal candidate for cardiac catheterization, different non-invasive parameters are in vogue. Same stands true for tissue Doppler echo-cardiographic imaging.<sup>7,8,15</sup>

Early mitral inflow velocity (E wave) and peak early diastolic velocity of mitral annulus (Ea) are indirect measurements of functionality of right heart when taking into account the relaxation phase.<sup>5-8</sup> In one local study by Ali et al, out of 60 patients of acute myocardial infarction, an E/Ea value >10 (48.3%) had a sensitivity of 77.7%, specificity of 80.6%, positive predictive value of 77.7% and a negative predictive value of 75.7% to predict LVEDP.<sup>12</sup> In another study by Arques S et al, an E/Ea value >10 had a sensitivity of 81.8% and specificity of 89.5% for identifying presence of heart failure in normal LV ejection fraction.<sup>16</sup> In the study by Cristian Mornos et al, an E/Ea value >10 had a sensitivity of 74% and a specificity of 73% to predict LVEDP.<sup>17</sup>

In our population, age distribution is showing an early start of myocardial infarction and coronary artery disease which is quite different from the trend in developed countries. It is a point to ponder and take actions to prevent risk factors and population strategies to look into the matter in local context & implement socially acceptable measures to halt this new epidemic of non-communicable diseases which are thought to be diseases of "west".<sup>12</sup>

The gender distribution shows an inclination towards male gender and proposed mechanism is perhaps the hormonal protection in females secondary to estrogen. Secondly in our social and demographic context, females are still following less sedentary lifestyle as compared to male population and are more hard working.

More than half of the patients when screened by tissue Doppler imaging were found to be having diastolic dysfunction showing its high incidence in naive patients with myocardial infarction. But TDI too under diagnosed it when it was compared with surrogate marker of left ventricular end diastolic pressure >15 on cardiac angiography. Sensitivity, specificity, positive predictive value and negative predictive value of TDI came out to be 77.91%, 78.13%, 82.7% and 72.5% respectively when we took LVEDP >15 as gold standard. This is quite acceptable. Our study results match with those of Ali et al<sup>12</sup> and Arques et al<sup>16</sup> but contradict others.<sup>17</sup>

To determine the effect of gender on diagnostic accuracy of tissue Doppler imaging, we stratified the data between male and female categories but there came out significant difference i.e. for male population sensitivity, specificity, positive predictive value and negative predictive value were 83.3%, 72.7%, 80.6% and 76.2% while for female population sensitivity, specificity, positive predictive value and negative predictive value were 70.8%, 82.6%, 80.9% and 73.1% respectively. Further comment on relationship of gender with diagnostic accuracy was not possible as the sample size was not representative.

Limitations of current study include not taking into account body mass index, anthropometric measurements<sup>18</sup> and time since diagnosis of coronary artery disease as all these factors may affect the outcome validity as has been shown regarding gender.

## Conclusion:

It is concluded that tissue doppler imaging is an acceptable non-invasive tool for diagnosis of early diastolic dysfunction in patients with coronary artery disease & myocardial infarction. The cardiologists should be sensitized regarding high prevalence of silent diastolic dysfunction in patients with preserved ejection fraction.



**Table 1: Results of Test in Rows and Disease (Gold Standard In Column)**

| TDI (Test) | Diastolic Dysfunction (LVEDP > 15) |        |
|------------|------------------------------------|--------|
|            | Present                            | Absent |
| E/Ea>10    |                                    |        |
| Positive   | a = 67                             | b = 14 |
| Negative   | c = 19                             | d = 50 |

TDI=tissue doppler imaging, LVEDP=Left ventricular end diastolic pressure, a=true positive, b=false positive, c=false negative, d=true negative

**Table II: Validity of Tissue Doppler Imaging in Determining the Diastolic Dysfunction**

| Measure                   | Formula                    | Result |
|---------------------------|----------------------------|--------|
| Sensitivity               | $\frac{a}{a+c} \times 100$ | 77.91% |
| Specificity               | $\frac{d}{b+d} \times 100$ | 78.13% |
| Positive predictive value | $\frac{a}{a+b} \times 100$ | 82.7%  |
| Negative predictive value | $\frac{d}{c+d} \times 100$ | 72.5%  |

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## Hepatoprotective Potential of Citrus Paradisi Flowers Against Paracetamol Induced Toxicity in Rabbits

Maaz Ahmad

**Objective:** To evaluate the hepatoprotective effect of Citrus paradisi flowers in the rabbits in whom hepatotoxicity was induced.

**Material & Methods:** Flowers of Citrus paradisi (CP) were collected, air dried and ground to powder. Hepatotoxicity was induced by oral administration of paracetamol suspension (2000 mg/kg body weight). 24 rabbits were divided into 4 groups A, B, C and D (n=6). Group A served as Normal control, while Group B received crude powder of dried flowers of Citrus paradisi (50 mg/kg body weight). Rabbits in group C were paracetamol treated receiving 2000 mg per kg body weight. Group D rabbits were given both paracetamol (2000 mg/kg) and Citrus paradisi powder (50 mg/kg). Serum transaminases and alkaline phosphatase (ALP) were monitored after 7 days and 14 days in all groups.

**Results:** Oral administration of CP flower powder (50 mg/kg) effectively inhibited paracetamol induced changes in the serum marker enzymes in rabbits. Increase in transaminases, Aspartate transaminase (AST), Alanine transaminase (ALT) and Alkaline phosphatase (ALP) was observed in paracetamol treated group. These values significantly decreased when paracetamol along with CP powder were given at a time and monitored after 7 and 14 days ( $p < 0.001$ ). However no significant difference was observed in CP powder treated group of rabbits ( $p > 0.05$ ). The results suggested that the CP flowers powder possessed significant potential as hepatoprotective agent.

**Conclusion:** The results of this study indicate that Citrus paradisi flowers contain some active constituent(s) responsible for its hepatoprotective activity in paracetamol treated rabbits.

**Key words:** Citrus paradisi, Hepatotoxicity, Paracetamol

### Introduction:

Herbs are the natural drugs used to regain the alterations made in normal physiological system by foreign organisms or by any malfunctioning of the body. Herbal medicines (now widely known as Natural Products and Nutraceuticals) had been the oldest form of healthcare. For centuries, natural products have been a major source of new drugs and drug leads. By the middle of the 19th century at least 80% of all medicines were derived from herbs. In every ethnic group there exists a traditional health care system, which is culturally patterned. The WHO has already recognized the contribution of traditional health care in tribal communities. The grapefruit (Citrus paradisi) is a subtropical citrus tree known for its sour to semi-sweet fruit, an 18th-century hybrid first bred in Barbados.<sup>1</sup> Grapefruit (Citrus paradisi) tree is found in United States of America, China, South Africa, Mexico, India, Argentina and Turkey. The chemical constituents obtained

from the fruit include naringin, hesperidin, neohesperidin, poncirin, tangeritin, nobiletin, auraptene, umbelliferone,  $\beta$ -sitosterol, stigmasterol,  $\alpha$ -pinene, limonene and sabinene.<sup>2</sup> Previously grapefruit was used as breakfast food but recent in-vivo and in-vitro studies indicate its anti-inflammatory, anti-cancer, anti-atherogenic, anti-depressant, anti-oxidant, hepatoprotective, anti-diabetic and antibacterial properties.<sup>3</sup>

Grapefruit is an excellent source of many nutrients and phytochemicals that contribute to a healthy diet.<sup>4</sup> Grapefruit is a good source of vitamin C, contains the fiber pectin and the pink and red hues contain the beneficial anti-oxidant lycopene. Studies have shown that grapefruit helps lower cholesterol and there is evidence that the seeds have anti-oxidant properties too.<sup>5</sup> Hepatoprotective role of Citrus paradisi was found in a study.<sup>6</sup> Grapefruit has been suggested as a treatment for several conditions, but there is currently insufficient scientific evidence to

support the use of grapefruit for any medical disorder.<sup>7</sup> In one study, Citrus paradisi juice protected liver histology and a largely preserved liver oxidative status.<sup>8</sup> In another study hepatoprotective effect was demonstrated.<sup>9</sup> Hydroxybenzoic acid is found in Citrus paradisi which is hepatoprotective.<sup>10,11</sup>

Pakistan is rich in medicinal herbs and many of them have been documented as effective therapies for various diseases. Need of the day is to explore this indigenous herbal wealth to at least minimize the agony of diseases in human beings.

### Material & Methods:

**Plant material:** Citrus paradisi trees were identified in local yards of Lahore. In the flowering season, flowers were collected, washed under running water, dried between folds of filter papers then air dried, powdered using Chinese herbal grinder and were stored at -20°C in zipped plastic bags until used.

**Chemicals:** Paracetamol was gifted by Askari pharmaceuticals (Lahore, Pakistan).

**Biochemical Analysis:** AST and ALT and ALP levels were evaluated by enzymatic kits (Randox) using Micro-lab 200 (Merck).

**Animals:** Male rabbits of local strain (*Oryctolagus cuniculus*) with average weight 1.35 kg and a range of 1.0-1.5 kg were used.

**Treatment of Rabbits:** All animals were housed in iron cages under standard lab conditions; green fodder and water were available ad libitum at the animal house. Animals received human care.

**Induction of Hepatotoxicity & Experimental Design:** Twenty four rabbits were divided randomly into 4 groups i.e A, B, C and D. Group A served as Normal Control group. Group B was given CP powder in a dose of 50 mg per kg body weight. Group C was paracetamol treated receiving 2000 mg per kg body weight. Paracetamol (2000 mg/kg) and CP powder (50 mg/kg) was simultaneously given to Group D rabbits. Two comparisons were made after 7 days and 14 days i.e. first between Group A and B to observe the effects of CP on liver enzymes and second between Group C and D to see the hepatoprotective role of CP on liver enzymes affected by the toxic effects of Paracetamol.

**Statistical Analysis:** Unpaired 't' Test was used to compare control and experimental groups with the help of SPSS ver. 13 and p-value was calculated. Level of significance was set at p-value less than 0.05.

### Results:

No significant difference ( $p > 0.05$ ) in AST, ALT and ALP was found in CP treated rabbits after 7 days (**Table 1**) and after 14 days (**Table 2**). While comparing Group D with Group C after 7 days, AST, ALT and ALP levels of group D were significantly lower ( $p < 0.000$ ) (**Table 3**). Similarly significant difference was found after 14 days ( $p < 0.000$ ) (**Table 4**).

### Discussion:

Liver is exposed to metabolites that may cause direct toxicity or there may be chance of immunological reaction either by drug itself or its active metabolite. It has been reported that 62% of withdrawn drugs produce toxic metabolites when administered. Various reactive species like hydroxyl radicals, super-oxide anions, hydrogen peroxide, single oxygen, nitric oxide and lipid oxides are generated in the body by external and internal factors. These radicals, react with various cellular organelles, leading to many disorders like cancer, hepatic ailments, inflammation and process of aging. Anti-oxidants are agents that can neutralize deleterious effects of free radicals. In order to keep balance between oxidants and anti-oxidants, exogenous support is taken. Plants with anti-oxidant properties are becoming more and more popular all over the world. Flowers of Citrus paradisi have been reported to be used in number of liver diseases as well. Effects of CP as hepatoprotective were demonstrated in the past through various studies. One study revealed its anti-hepatotoxic effect in rifampicin and paracetamol induced hepatotoxicity in chicks. Another study on Wistar rats also showed hepatoprotective effects of CP. In one study on male albino rats, anti-oxidant effect of CP was demonstrated. All these findings were showing hepatoprotective role of CP. Present study results are similar to the above mentioned studies carried out in the past. In the present study, paracetamol caused the liver injury at higher doses. The elevation of AST, ALT and

ALP were indicative of the release of enzymes from disrupted cells. CP treatment significantly reduced the raised levels of AST, ALT and ALP in hepatotoxic rabbits. The decrease in the serum levels of these enzymes might possibly be due to the presence of such constituents in CP powder that enhanced the regeneration ability of liver. Crude powder of dried flowers of CP was used first time to see its hepatoprotective effect.

### Conclusion:

We concluded that CP contains active constituent(s) that contributed towards its hepatoprotective effect in paracetamol induced toxicity in rabbits. It may be one of the potential targets for the development of new therapies for the treatment of various hepatic diseases. Findings in this study point out that Citrus paradisi proved to be an effective hepatoprotective agent.

**Table 1: AST, ALT, and ALP levels of group A and B rabbits after 7 days:**

| Groups               | AST          | ALT          | ALP          |
|----------------------|--------------|--------------|--------------|
| Control Group A      | 39.34 ± 5.78 | 32.63 ± 3.87 | 43.53 ± 3.77 |
| Experimental Group B | 36.43 ± 5.88 | 31.56 ± 1.90 | 41.23 ± 2.35 |
| p- value             | ns           | ns           | ns           |

**Table 2: AST, ALT, and ALP levels of group A and B rabbits after 14 days::**

| Groups               | AST          | ALT          | ALP          |
|----------------------|--------------|--------------|--------------|
| Control Group A      | 37.84 ± 5.87 | 33.45 ± 3.76 | 45.71 ± 2.98 |
| Experimental Group B | 35.58 ± 6.13 | 30.23 ± 2.12 | 43.41 ± 2.15 |
| p- value             | ns           | ns           | ns           |

**Table 3: AST, ALT, and ALP levels of group C and D rabbits after 7 days:**

| Groups               | AST            | ALT            | ALP            |
|----------------------|----------------|----------------|----------------|
| Group C              | 213.32 ± 18.76 | 332.11 ± 13.54 | 176.96 ± 13.43 |
| Experimental Group D | 145.34 ± 11.76 | 210.79 ± 12.76 | 109.56 ± 12.23 |
| p- value             | < 0.001        | < 0.001        | < 0.001        |

**Table 4: AST, ALT, and ALP levels of group C and D rabbits after 14 days:**

| Groups               | AST            | ALT           | ALP            |
|----------------------|----------------|---------------|----------------|
| Group C              | 227.38 ± 18.23 | 340.76 ± 9.12 | 168.54 ± 11.71 |
| Experimental Group D | 121.86 ± 7.65  | 132.59 ± 9.34 | 66.25 ± 8.66   |
| p- value             | < 0.001        | < 0.001       | < 0.001        |

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## Risk Factors Predisposing to Development of Hepatitis C in Patients Presenting in a Tertiary Care Hospital of Lahore

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**Objective:** To determine risk factors predisposing to the development of Hepatitis C in patients presenting in Mayo Hospital, Lahore.

**Material & Methods:** A case control study was conducted on 400 patients coming in outpatient department of Mayo Hospital Lahore for the treatment of Hepatitis C during the year 2011-2012. 200 were diagnosed cases of hepatitis C and the other 200 who presented in the hospital for cure of seasonal infections like cough, influenza were taken as controls. They were enquired about the risk factors with the help of a pre-designed questionnaire.

**Results:** Out of 400 patients, 256 (64.0%) were males and 144 (36.0%) were females. The mean age of the patients was  $42.95 \pm 13.77$  years. Hepatitis B, blood transfusion, IV drug abuse and dental procedures were significantly associated with the development of Hepatitis C. However, co-morbid problems, body piercing, history of surgical procedures, intravenous intake and family history of hepatitis C were insignificant though their frequency was high among cases as compared to the controls.

**Conclusion:** There are modifiable risk factors of Hepatitis C. If such risk factors are controlled then the incidence of Hepatitis C can be reduced.

**Key Words:** Hepatitis C, Risk factors, Prevention

### Introduction:

Hepatitis C is a blood borne liver disease, caused by the hepatitis C virus (HCV) discovered in 1989.<sup>1</sup> Around 3% of the world population is infected with hepatitis C virus is the leading cause of chronic liver disease. Most populations in the Americas, Europe and South-East Asia have HCV prevalence rates of under 2.5%. In the Western Pacific regions and parts of South America, prevalence rates are higher - between 2.5-4.9%. In contrast, in populations in the Middle East and Africa, HCV prevalence has been shown to range from 1-12%.<sup>2</sup> In some countries, the prevalence of hepatitis C is 10-15%. Pakistan is an endemic area for hepatitis C. According to the recent studies, prevalence of hepatitis B in Pakistan is 2.5 % and of hepatitis C about 5%.<sup>3</sup> Clarification for HCV risk factors and modes of transmission is essential in developing better management and prevention of secondary transmission.<sup>4</sup> This study was therefore entirely necessary to discover these factors in local settings.

### Objective:

The objective of this study was to determine risk factors predisposing to the development of

Hepatitis C in patients presenting in Mayo Hospital, Lahore

### Material & Methods:

400 patients were included in this case control study during the year 2011-2012. Case-control ratio was 1:1. Out of the 400 patients, 200 were diagnosed cases of hepatitis C and the other 200 who presented in the hospital for cure of seasonal infections like cough, influenza were taken as controls. Informed consent was obtained. Demographic details and history of other medical disorders were gathered from the patients. Patients of age 14 years or more from both genders married and non-married were selected by convenient sampling and were asked about the risk factors.

Quantitative variables like age, were presented as mean  $\pm$  standard deviation. Frequency and percentages were calculated for qualitative variables like gender. Statistical analysis was done using SPSS version 10. Two sided Chi-square Test was used to assess the risk factors of Hepatitis C.

There were no ethical issues as it was an observational study and informed consent from each patient had been obtained.



## Results:

Out of total 400 patients, 256 (64.0%) were males and 144 (36.0%) were females. Mean age was  $42.95 \pm 13.77$  years with a range of 14-81 years. (The mean age of both groups is shown in **table I**). Among all respondents, 357 (89.3%) were married while 43 (10.8%) were unmarried. Hepatitis B was also observed in 5 (2.5%) patients who also had Hepatitis C. It also showed a significant association between Hepatitis B and C (OR = 2.026, 95% CI: 1.833-2.238). Female gender was an insignificant risk factor (OR = 0.878, 95% CI: 0.583-1.321). Blood transfusion among cases was significantly high (OR = 2.504, 95% CI: 1.673-3.745). Body piercing was observed to be insignificant factor among both cases and controls (OR = 1.332, 95% CI: 0.895-1.983) as almost all females were exposed to this factor; some of the male youngsters were also exposed to the factor but in both groups the frequency was almost equal. History of surgical procedures like CABG, renal transplant and hemodialysis was found to be insignificant risk factor (OR = 1.312, 95% CI: 0.878-1.961) however dental procedure was a significant risk factor for hepatitis C (OR = 8.332, 95% CI: 5.320-13.049) and its frequency was extremely high among cases (73.0%) as compared to controls (24.5%) ( $p=0.000$ ). Intravenous drug intake was also an insignificant risk factor (OR = 1.222, 95% CI: 0.825-1.811); the frequency was almost equal, but intravenous drug abuse was found to be a significant risk factor (OR = 2.375, 95% CI: 1.540-3.662). In this study, family history of Hepatitis C was not a risk factor for hepatitis C (OR = 1.476, 95% CI: 0.724-3.012).

## Discussion:

Hepatitis B and C are global health problems affecting every 12th individual on our planet.<sup>5,6</sup> In Pakistan contaminated needles, unsterile dental and surgical equipment, drug abuse, unsafe blood & blood product transfusion & re-use of razors by barbers are the major risk factors.<sup>7,8</sup>

According to this study, hepatitis B is a significant co-risk factor for developing hepatitis C. Being female is a risk factor for hepatitis C but was found insignificant in this study. Family history was also insignificant risk

factor for hepatitis C in this study.

According to this study, history of blood transfusion was also very frequent among cases and was statistically significant. In the past, blood transfusion or use of other blood products was a major risk factor for transmission of HCV. In some historic cohorts 10% or more of patients who received blood transfusions were infected with hepatitis C.<sup>9</sup> Transfusion of blood products has been a leading cause of transmission of HCV; however, due to improved screening, transmission through transfusions has decreased in most developed countries. In Japan, incidence of post-transfusion non-A non-B hepatitis among those with less than 10 transfusions dropped from 4.9% to 1.9% after screening.<sup>10</sup> In the US, incidence of post-transfusion hepatitis C dropped from 3.84% to 0.57% per patient after HCV screening was introduced in 1990.<sup>11</sup> In England, the frequency of HCV infected donations dropped from 1 in 520,000 to 1 in 30 million when donations were tested for HCV RNA.<sup>12</sup> However, incidence of transfusion related hepatitis C is still higher in other areas of the world. In a study of 147 Chilean patients with chronic hepatitis C, the most common risk factor was blood transfusion in 54% versus just 5% with IV drug use.<sup>13</sup> A study was done in the largest blood bank in Santa Catarina, Brazil from 1991-2001 showing a significant drop in risk of acquiring HCV, but the lowest risk of 1:13721 was still almost 10 times higher than that of developed countries.<sup>14</sup>

According to this study, having undergone any surgical procedure like CABG, renal transplant and hemodialysis was found to be an insignificant risk factor. It has been well known from literature that dialysis patients have a higher rate of HCV infection. In the 90's much of the world reported anti-HCV prevalence rates of 10-50% among hemodialysis patients with lower rates in such places as Ireland.<sup>15-19</sup> Previously, rates in Europe were as high as 20-30%.<sup>20</sup> A more recent report from Saudi Arabia showed a prevalence rate of HCV among hemodialysis patients to be high compared to blood donors.<sup>21</sup> In a tertiary-care hospital in Mexico City, Mexico, the rate of anti-HCV was 6.7% compared to



**Table 1: Demographic Characteristics of Respondents**

| Variables      | HCV Positive  | HCV Negative  |
|----------------|---------------|---------------|
| Age            | 42.27 ± 13.79 | 43.63 ± 13.74 |
| Gender         |               |               |
| Male           | 125           | 131           |
| Female         | 75            | 69            |
| Marital status |               |               |
| Married        | 169           | 188           |
| Unmarried      | 31            | 12            |

**Table 2: Odds Ratios of Hepatitis C Risk Factors**

| Risk Factors                            | Cases | Controls | p-value | Odds Ratio (95% CI)    |
|---|-------|----------|---------|------------------------|
| Hepatitis B                             | 5     | 0        | 0.024   | 2.026 (1.833 – 2.238)  |
| Gender (Female)                         | 125   | 131      | 0.532   | 0.878 (0.583 – 1.321)  |
| Co-morbidity                            | 66    | 74       | 0.402   | 0.839 (0.556 – 1.265)  |
| Blood transfusions                      | 118   | 73       | 0.000   | 2.504 (1.673 – 3.745)  |
| Body piercing                           | 92    | 78       | 0.157   | 1.332 (0.895 – 1.983)  |
| Surgical Procedures (CABG/Hemodialysis) | 86    | 73       | 0.184   | 1.312 (0.878 – 1.961)  |
| IV intake in past                       | 110   | 100      | 0.317   | 1.222 (0.825 – 1.811)  |
| IV drug user                            | 83    | 46       | 0.000   | 2.375 (1.540 – 3.662)  |
| Family history of Hep C                 | 20    | 14       | 0.282   | 1.476 (0.724 – 3.012)  |
| Dental Procedures                       | 146   | 49       | 0.000   | 8.332 (5.320 – 12.049) |

no other risk factors has been reported 1.38-1.9% per year.<sup>23,24</sup> These studies point out that transmission of HCV to hemodialysis patients is generally hospital acquired with possible risk factors being failure to disinfect devices in between patients, sharing of single-use vials for infusions, poor sterile technique, poor cleaning of dialysis machines, and poor distance between chairs.<sup>25</sup>

Dental procedure however, was a significant risk factor for hepatitis C. According to this study its frequency was extremely high among cases (73.0%) as compared to controls (24.5%). Intravenous intake was an insignificant risk factor; the frequency was almost equal in cases & controls, whereas intravenous drug abuse was found to be a significant risk factor. Transmission of Hepatitis C virus is strongly and significantly associated with intravenous drug and needle use. In a study of injection drug users in Baltimore, Maryland from 1988 to 1996, 30.3% of participants developed anti-

HCV antibodies with most in the first 2 years of the study.<sup>26</sup> Among 310 drug users in Antwerp and Limburg in Belgium, 71% and 46% had anti-HCV antibody, respectively.<sup>27</sup> The Hepatitis C European Network for Co-operative Research (HENCORE) group reported a prevalence of Hepatitis C of 80% among intravenous drug users (IVDU).<sup>20</sup> In the District Buner study in Pakistan, all 751 anti-HCV positive patients had a history of injections. About 90% of IV drug users (IVDU) in Chiang Rai, Thailand were positive for HCV.<sup>28</sup> In Sydney, 36.6% of randomly selected IVDU, 74% of IVDU in Melbourne, Australia were HCV positive.<sup>29,30</sup> A recent study in London, England took 428 intravenous drug users below the age of 30 and found that 44% had antibodies to hepatitis C compared to 4% with HIV. This came out to an incidence of 41.8 cases per 100 person years of antibody to HCV.<sup>31</sup>

The importance of intravenous drug use cannot

be overemphasized. The prevalence of HCV among people who acquired HIV through intravenous drug use reaches 90%. Co-infection of the two viruses can make treatment all the more difficult. Most countries with a young population of HCV infection must deal with intravenous drug use as the leading cause for spread of the virus. Many of these intravenous drug users do not know they are infected.<sup>32</sup>

## Conclusion:

Many of the risk factors predisposing to the development of Hepatitis C are modifiable and prevalence of hepatitis C can be reduced in our society by controlling the exposure to these risk factors. This requires a proper awareness program for the society about risk factors and modes of transmission to prevent the problem as no vaccination is available yet. Policies regarding health care providers and hospitals should be revised and implemented strictly.

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## Psycho-Social Determinants of Lack of Interest in Studies Among Students in Medical Institutions of Lahore Pakistan

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**Objective:** To determine the association between various psycho-social factors and lack of interest in studies among students in medical institutions of Lahore, Pakistan.

**Material & Methods:** A population based case-control study with 1:1 case to control ratio was conducted in various Medical Colleges of Lahore between May 2010 & July 2010. A total of 100 persons (50 cases and 50 controls) were recruited in the study. Selection was made on laid down criteria from adult population studying in medical institutions, Lahore after taking due consent. Interviews were conducted through a pretested questionnaire by a 9 member team of 4<sup>th</sup> year MBBS students of King Edward Medical University, Lahore, under supervision of Department of Community Medicine, KEMU. Data was collected, compiled and analyzed through SPSS version 13.

**Results:** Overall 48% were males and 52% were female in the study. Among uninterested cases mostly were females (52%), between the age group 21-25 years (88%) and 4<sup>th</sup> year (76%). In bivariate analysis, lack of interest in studies in medical institutions was found more related with repeated failures (OR 27.576, 95% CI=3.505-216.76) constipation (OR 9.333, 95% CI=1.127-77.704), lack of incentives (OR 8.273, 95% CI=3.357-20.388), lethargy (OR 6.291, 95% CI=1.360-6.349), teachers not liked (OR 6.274, 95% CI=2.245-17.294), lack of aptitude (OR 6.000, 95% CI=2.453-14.674), back benchers (OR 5.464, 95% CI=2.320-12.872), casual attitude (OR 5.091, 95% CI=2.091-12.396), sedentary lifestyle (OR 3.930, 95% CI=1.688-9.154), peer pressure (OR 3.632, 95% CI=1.082-12.183), lack of regular prayers (OR 3.551, 95% CI=1.541-8.181), subjects not liked (OR 3.500, 95% CI=1.361-8.999), depression (OR 3.143, 95% CI=1.291-7.653), load shedding (OR 2.495, 95% CI=1.105-3.629), aggression (OR 2.279, 95% CI=1.017-5.108), not washing hands after toilet (OR 2.111, 95% CI=1.208-2.610), broken families (OR 2.042, 95% CI=1.668-2.499). However after multivariate analysis while controlling all other listed risk factors, lack of interest in studies in medical institutions was found more related with repeated failures (OR 55.382, 95% CI=2.499-1227.294), lethargy (OR 11.709, 95% CI=1.753-78.206), family illiteracy (OR 10.760, 95% CI=1.763-65.666), lack of aptitude (OR 8.197, 95% CI=1.637-41.036), back benchers (OR 5.842, 95% CI=1.185-28.798) & lack of prayers (OR 4.124, 95% CI=1.037-16.399).

**Conclusion:** Lack of interest in medical studies can be minimized by controlling repeated failures and lethargy.

**Key words:** Lack of interest in studies in medical institutions, Psychological factors, Social factors, Urban, Community

### Introduction

Lack of interest in study means not having sense of concern with and curiosity about study.<sup>1</sup> It also means a state of being without feelings and emotions that cause progressive loss of attention to focus on studies. The goal of medical education is to graduate as a skillful and professional physician and to fulfill this goal our personal interest in medical studies is a basic requirement.

One survey conducted in Tibet by TCEWF shows the main causes of lack of interest in medical studies to be casual attitude, financial problems, personal problems, lack of career counseling, lack of aptitude, job insecurity, peer pressure, communication gap, favoritism by teachers, lack of guidance, bad company, lack of parental attention and lack of intelligence.<sup>2</sup> In different studies overcrowding in houses,<sup>3</sup> insult by teachers,<sup>4</sup> chronic illness,<sup>5</sup> fatigue,<sup>5</sup> family



problems,<sup>6</sup> poverty,<sup>7,8</sup> type-A personality,<sup>9</sup> smoking,<sup>10</sup> lack of aptitude,<sup>11</sup> poor teaching skills,<sup>12,13</sup> communication gap<sup>14</sup> and anxiety.<sup>15</sup> In multiple studies it was found that depression causes lack of interest in studies.<sup>16,17,18</sup> A study by Gillman & Murray reveals that dusty environment leads to the problem.<sup>19,20</sup> In different studies financial problems,<sup>21</sup> aggression,<sup>22</sup> alcohol intake<sup>23</sup> and believing in myths<sup>24</sup> were found to be related to the problem. Poor examination system,<sup>25</sup> not liking the medical subjects,<sup>26</sup> exposure to magnetic field,<sup>27</sup> narcotics use,<sup>28</sup> obesity,<sup>29</sup> homesickness,<sup>30</sup> and introvert personality<sup>31,32</sup> were found to be associated with the problem in different studies. Some studies have disclosed that job insecurity,<sup>33,34</sup> undue late night working,<sup>35</sup> lengthy lectures,<sup>36</sup> load shedding,<sup>37</sup> love affairs,<sup>38</sup> negative impact of bad company,<sup>39</sup> lack of exercise<sup>40</sup> emotional stress,<sup>41</sup> unnecessary extracurricular activities,<sup>42</sup> excessive mobile use,<sup>43,44</sup> poor examination system,<sup>45</sup> lack of sound sleep,<sup>46</sup> fatigue,<sup>47</sup> joint family system,<sup>48</sup> dieting,<sup>49</sup> lack of prayers,<sup>50</sup> improper intake of fruit & vegetables<sup>51,52</sup> and high fat diet and junk food<sup>53</sup> were among the major causes. A study conducted in 2004 showed that media has a negative impact on studies.<sup>54</sup> Constipation,<sup>55</sup> family illiteracy,<sup>56,57</sup> male dominance,<sup>58,59</sup> lack of incentives,<sup>60,61</sup> poor sanitation & lack of personal hygiene,<sup>62</sup> sense of insecurity,<sup>63</sup> irregular timings of meals,<sup>64</sup> congested class rooms,<sup>65</sup> spicy food,<sup>66,67</sup> junk food,<sup>68</sup> not taking rest after lunch,<sup>69</sup> immediate rest after dinner,<sup>70</sup> sedentary lifestyle.<sup>71</sup> A study showed that skipping meals can lead to out-of-control hunger, often resulting in overeating.<sup>72,73</sup> In another study it was found that exposure to vehicle exhaust leads to the problem.<sup>74</sup> Multiple studies showed that back benchers,<sup>75</sup> not liking the teachers,<sup>76</sup> poor time management<sup>77,78</sup> and resident in industrial area<sup>79</sup> were also responsible.

Lack of interest in studies in medical institutions is emerging as a major issue in urban communities. Little work has been done in finding the association of various psycho-social factors with lack of interest in studies in medical institutions in our community. So there was dire need to conduct this study to identify important predictors of lack of interest in studies among students in medical institutions while con-

rolling for other factors, to compare the results with the already conducted studies and to help students to make decisions to improve their education and therefore improve the health status of the community.

## Material & Methods

A case-control study was conducted to identify various psycho-social factors associated with lack of interest in studies in medical institutions of Lahore between May 2010 & July 2010. Study population was divided into two groups. Case group included adult medical students (age >18 years) suffering from lack of interest in studies and were not suffering from any other major medical or surgical illness and were fulfilling the criteria laid down for depression.<sup>1</sup> The control group comprised of healthy adults who did not suffer from lack of interest in studies or any other major medical or surgical illness.

All eligible cases included in study were randomly selected, while a systematic random sampling approach was used to recruit study controls. Written consent was obtained from all selected study subjects. Data was collected by interviews, conducted by the 4<sup>th</sup> year MBBS students of King Edward Medical University Lahore using pretested and close ended questionnaire, while keeping all ethical and social considerations in mind. Data collection was supervised by the staff of Department of Community Medicine King Edward Medical University, Lahore.

Data entry and analysis was done by statistical software SPSS version 13 at computer lab of KEMU. After describing the demographic characteristics using frequency tables, simple and multivariate logistic regression was used to calculate odds ratio and their 95% confidence intervals.

## Results

Among cases (those with lack of interest in studies) most were females (52%), above the age of 20 years (88%) and 4<sup>th</sup> year (76%). In the control group majority were males (48%) above the age of 20 years (61%) and 4<sup>th</sup> year (52%).

In bivariate analysis the psycho-social factors which were found significantly associated were repeated failures (OR 27.576, 95% CI=3.505-

216.76) constipation (OR 9.333, 95% CI = 1.127-77.704), lack of incentives (OR 8.273, 95% CI=3.357-20.388), lethargy (OR 6.291, 95% CI=1.360-6.349), teachers not liked (OR 6.274, 95% CI=2.245-17.294), lack of aptitude (OR 6.000, 95% CI=2.453-14.674), back benchers (OR 5.464, 95% CI=2.320-12.872), casual attitude (OR 5.091, 95% CI=2.091-12.396), sedentary life style (OR 3.930, 95% CI=1.688-9.154), peer pressure (OR 3.632, 95% CI=1.082-12.183), lack of regular prayers (OR 3.551, 95% CI=1.541-8.181), subjects not liked (OR 3.500, 95% CI=1.361-8.999), depression (OR 3.143, 95% CI=1.291-7.653), load shedding (OR 2.495, 95% CI=1.105-3.629), aggression (OR 2.279, 95% CI=1.017-5.108), not washing hands after toilet (OR 2.111, 95% CI=1.208-2.610) and broken families (OR 2.042, 95% CI=1.668-2.499) (**table 1**). Alcohol intake, believing in myths, believing in rituals, chronic illness, communication gap, congested class rooms, dieting, dusty environment, excessive mobile use, false practices, family problems, favoritism by teachers, financial stress, haste, high fat diet, home sickness, immediate rest after dinner, insult by teachers, introvert personality, irregular timings of meals, job insecurity, joint family system, junk food, lack of exercise, lack of personal hygiene, lack of regular intake of fruits, lack of regular intake of vegetables, lack of rest after lunch, lack of sound sleep, lengthy lectures, love affairs, magnetic field exposure, male dominance, narcotics use, not washing hands before meal, negative impact of media, negative impact of bad company, no counseling, non-examination subjects, obesity, over crowding in houses, pan eating, poor sanitation, poor time management, poor examination system, poverty, residence in industrial area, smoking, smoking passively, smoky environment, subjects not liked, teachers not liked, terrorism, type-A personality, undue late night working, unavailability of competitive environment, unnecessary extracurricular activities and vehicle exhaust exposure were not found to be associated with the problem.

Multi-variate logistic regression model was used to control for possible confounding effect. It was observed that there were some changes between the crude odds ratios and the adjusted

odds ratios. It was observed that after controlling for all the factors studied the strongest statistically significant association was exhibited by repeated failures (OR 55.382, 95% CI=2.499-1227.294), lethargy (OR 11.709, 95% CI=1.753-78.206), family illiteracy (OR 10.760, 95% CI=1.763-65.666), lack of aptitude (OR 8.197, 95% CI=1.637-41.036), back benchers (OR 5.842, 95% CI=1.185-28.798) and lack of prayers (OR 4.124, 95% CI=1.037-16.399) (**Table 1**).

## Discussion

The determinants of lack of interest in studies among students in medical institutions are complex and can differ from country to country or even from one community to another. Many psycho-social factors determine the lack of interest in studies in medical institutions. Our results showed the risk of lack of interest in studies increased with repeated failures, which is not consistent with current body of knowledge. Many studies showed that lethargy predisposes to the problem.<sup>5,47</sup>

In one study it was found that family illiteracy increases the risk of problem.<sup>56,57</sup> Multiple studies showed the relationship of lack of aptitude to the problem.<sup>60,61</sup> In one study it was found that backbenchers are more prone to develop the problem.<sup>75</sup> In many studies lack of prayers was found to predispose to the problem<sup>5</sup> along with anxiety, emotional stress, lack of incentives, sedentary life style, casual attitude, load shedding & repeated failures, while aggression, alcohol intake, believing in myths, believing in rituals, broken families, chronic illness, communication gap, congested class rooms, constipation, depression, dieting, dusty environment, excessive mobile use, false practices, family problems, favoritism by teachers, financial stress, haste, high fat diet, home sickness, immediate rest after dinner, insult by teachers, introvert personality, irregular timings of meal, job insecurity, joint family system, junk food, lack of exercise, lack of personal hygiene, lack of regular intake of fruits, lack of regular intake of vegetables, lack of rest after lunch, lack of sound sleep, lengthy lectures, love affairs, peer pressure, poor sanitation, poor time management, poor examination system,



poverty, residence in industrial area, smoking, smoking passively, smoky environment, subjects not liked, teachers not liked, terrorism, type-A personality, undue late night working, unavailability of competitive environment, unnecessary extracurricular activities, vehicle exhaust exposure, magnetic field exposure, male dominance, narcotics use, not washing hands before meals, not washing hands after toilet, negative impact of media, negative impact of bad company, no counseling, non-examination subjects, obesity, overcrowding in houses and pan eating were not found to be significantly associated.

### Limitation of the study

As the exposure and outcome were assessed

almost simultaneously in this study, temporal association between lack of interest in studies in medical institutions and factors studied could not be adequately established, which can be remedied by conducting a cohort study in a similar population.

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**Table 1. Association of Psycho-Social Factors with Lack of Interest in Studies in Medical Personal/Psychological Factors**

| Socio demographic Factors |  | Lack of interest in studies in medical institutions |     | Bivariate Analysis |        |        | Multivariate Analysis |        |          |
|---------------------------|--|---|-----|--------------------|--------|--------|-----------------------|--------|----------|
|                           |  |   |     | Crude Odds Ratio   | 95% CI |        | Adj. Odds Ratio       | 95% CI |          |
|                           |  |   |     |                    | Lower  | Upper  |                       | Lower  | Upper    |
| Case n=50                 | Control n=50                           |   |     |                    |        |        |                       |        |          |
| 01                        | Repeated failures                      | 36%   | 2%  | 27.576             | 3.505  | 216.76 | 55.382                | 2.499  | 1227.244 |
| 02                        | Lethargy                               | 82%   | 42% | 6.291              | 2.521  | 15.696 | 11.709                | 1.753  | 78.206   |
| 03                        | Chronic illness                        | 10%   | 6%  | 1.741              | .393   | 7.713  | 7.909                 | .402   | 155.573  |
| 04                        | Back benchers                          | 72%   | 32% | 5.464              | 2.320  | 12.872 | 5.842                 | 1.185  | 28.798   |
| 05                        | Narcotic Use                           | 20%   | 96% | 2.875              | .837   | 9.881  | 4.643                 | .376   | 57.280   |
| 06                        | Depression                             | 44%   | 20% | 3.143              | 1.291  | 7.653  | 3.592                 | .444   | 29.047   |
| 07                        | Emotional stress                       | 42%   | 26% | 3.083              | .330   | 7.149  | 2.420                 | .508   | 11.529   |
| 08                        | Teachers not liked                     | 46%   | 12% | 6.247              | 2.257  | 17.294 | 2.210                 | .317   | 15.426   |
| 09                        | Non examination subjects               | 36%   | 22% | 1.994              | .824   | 4.827  | 1.972                 | .434   | 8.969    |
| 10                        | Lack of sound sleep                    | 30%   | 16% | 2.250              | .854   | 5.925  | 1.834                 | .285   | 11.808   |
| 11                        | Unnecessary extracurricular activities | 20%   | 20% | 1.000              | .375   | 2.664  | 1.612                 | .244   | 10.661   |
| 12                        | Aggression                             | 54%   | 34% | 2.279              | 1.017  | 5.108  | 1.560                 | .251   | 9.704    |
| 13                        | Haste                                  | 52%   | 34% | 2.103              | .939   | 4.710  | 1.478                 | .284   | 7.700    |
| 14                        | Insult by teachers                     | 54%   | 48% | 1.272              | .580   | 2.790  | 1.131                 | .277   | 4.614    |
| 15                        | Casual attitude                        | 56%   | 20% | 5.091              | 2.091  | 12.396 | .982                  | .220   | 4.379    |
| 16                        | Subjects not liked                     | 40%   | 16% | 3.500              | 1.361  | 8.999  | .868                  | .129   | 5.833    |
| 17                        | Sense of insecurity                    | 32%   | 20% | 1.882              | .756   | 7.690  | .828                  | .109   | 6.303    |
| 18                        | Introvert personality                  | 50%   | 48% | 1.083              | .494   | 2.373  | .252                  | .026   | 2.437    |
| 19                        | Anxiety                                | 44%   | 36% | 1.397              | .626   | 3.119  | .532                  | .082   | 3.450    |
| 20                        | Poor time management                   | 70%   | 54% | 1.988              | .874   | 4.521  | .490                  | .111   | 2.166    |
| 21                        | Excessive mobile usage                 | 52%   | 42% | 1.496              | .679   | 3.214  | .431                  | .099   | 1.880    |
| 22                        | Smoking                                | 18%   | 10% | 1.976              | .612   | 6.380  | .356                  | .029   | 4.376    |
| 23                        | Home sickness                          | 46%   | 48% | .923               | .421   | 2.024  | .298                  | .056   | 1.602    |
| 24                        | Type A personality                     | 72%   | 72% | 1.000              | .418   | 2.394  | .252                  | .026   | 2.437    |
| 25                        | Male Dominance                         | 10%   | 4%  | 2.667              | .492   | 14.445 | .129                  | .006   | 2.937    |

|    | <b>Social Factors</b>                     |     |       |       |       |        |        |       |         |
|----|---|-----|-------|-------|-------|--------|--------|-------|---------|
| 01 | Family illiteracy                         | 26% | 14%   | 2.158 | .779  | 5.977  | 10.760 | 1.763 | 65.666  |
| 02 | Constipation                              | 16% | 2%    | 9.333 | 1.127 | 77.704 | 8.857  | .269  | 291.227 |
| 03 | Lack of aptitude                          | 60% | 20%   | 6.000 | 2.453 | 14.68  | 8.197  | 1.637 | 41.036  |
| 04 | Sedentary life style                      | 4%  | 42%   | 3.930 | 1.688 | 9.154  | 0.412  | .076  | 2.236   |
| 05 | Lack of Regular Prayers                   | 58% | 28%   | 3.551 | 1.541 | 8.181  | 4.124  | 1.037 | 16.399  |
| 06 | Lack of incentives                        | 78% | 30%   | 8.273 | 3.357 | 20.388 | 2.741  | .663  | 11.322  |
| 07 | Peer pressure                             | 24% | 8%    | 3.632 | 1.082 | 12.183 | 2.574  | .340  | 19.487  |
| 08 | Family problems                           | 22% | 14%   | 1.733 | .611  | 4.912  | 2.097  | .268  | 16.394  |
| 09 | Undue late night working                  | 64% | 52%   | 1.641 | .737  | 3.655  | .650   | .189  | 2.237   |
| 10 | Favoritism by teachers                    | 58% | 58%   | 1.000 | .452  | 2.213  | 1.156  | .269  | 4.963   |
| 11 | Negative impact of bad company            | 14% | 6%    | 2.550 | .620  | 10.492 | 1.122  | .074  | 16.984  |
| 12 | Love affairs                              | 14% | 8%    | 1.872 | .512  | 6.848  | 1.061  | .102  | 11.042  |
| 13 | Job insecurity                            | 38% | 22%   | 2.173 | .902  | 5.237  | 1.034  | .222  | 4.830   |
| 14 | Joint Family System                       | 32% | 32%   | 1.000 | .432  | 2.317  | .934   | .244  | 3.575   |
| 15 | Terrorism                                 | 54% | 60%   | .783  | .354  | 1.730  | .650   | .189  | 2.237   |
| 16 | Negative impact of media                  | 80% | 82%   | .878  | .323  | 2.388  | .412   | .091  | 1.872   |
| 17 | Poverty                                   | 24% | 24%   | 1.000 | .399  | 2.504  | .412   | .076  | 2.236   |
| 18 | Lack of Exercise                          | 72% | 70%   | 1.102 | .464  | 2.615  | .330   | .073  | 1.479   |
| 19 | Communication gap                         | 14% | 14%   | 1.000 | .323  | 3.095  | .306   | .038  | 2.468   |
| 20 | Financial stress                          | 14% | 12%   | 1.194 | .371  | 3.841  | .154   | .015  | 1.568   |
|    | <b>Environmental factors</b>              |     |       |       |       |        |        |       |         |
| 01 | Overcrowded houses                        | 6%  | 48%   | 1.532 | .245  | 9.587  | 3.065  | .251  | 37.404  |
| 02 | Lengthy lectures                          | 76% | 58%   | 2.293 | .972  | 5.410  | 2.410  | .881  | 6.592   |
| 03 | Load shedding                             | 54% | 32%   | 2.495 | 1.105 | 5.629  | 2.133  | .829  | 5.486   |
| 04 | Poor sanitation                           | 30% | 24%   | 1.357 | .559  | 3.295  | 1.974  | .619  | 6.296   |
| 05 | Unavailability of competitive environment | 40% | 22%   | 2.364 | .984  | 5.677  | 1.887  | .664  | 5.368   |
| 06 | Dusty environment                         | 40% | 40%   | 1.000 | .449  | 2.226  | 1.792  | .536  | 5.986   |
| 07 | Vehicle exhaust exposure                  | 68% | 62%   | 1.302 | .571  | 2.969  | 1.682  | .595  | 4.758   |
| 08 | Congested class rooms                     | 68% | 58%   | 1.539 | .679  | 3.485  | 1.277  | .490  | 3.327   |
| 09 | Smoky environment                         | 32% | 32%   | 1.000 | .432  | 2.371  | 1.215  | .389  | 3.800   |
| 10 | Poor examination system                   | 80% | 66%   | 2.061 | .832  | 5.104  | 1.164  | .399  | 3.396   |
| 11 | Magnetic field Exposure                   | 28% | 28%   | 1.000 | .418  | 2.394  | .545   | .169  | 1.755   |
| 12 | Residence in industrial area              | 40% | 56%   | .524  | .237  | 1.160  | .305   | .103  | .907    |
|    | <b>Nutritional factors</b>                |     |       |       |       |        |        |       |         |
| 01 | Pan eating                                | 20% | 8%    | 2.875 | .837  | 9.881  | 2.826  | .751  | 10.641  |
| 02 | Lack of regular Intake of fruits          | 24% | 12%   | 2.316 | .793  | 6.764  | 2.634  | .726  | 9.560   |
| 03 | Obesity                                   | 22% | 12.2% | 2.021 | .683  | 5.982  | 1.824  | .554  | 6.009   |
| 04 | Irregular timings of meal                 | 44% | 30%   | 1.833 | .805  | 4.176  | 1.751  | .673  | 4.559   |
| 05 | Lack of rest after lunch                  | 28% | 22%   | 1.379 | .555  | 3.427  | 1.484  | .546  | 4.030   |
| 06 | High fat diet                             | 34% | 24%   | 1.631 | .681  | 3.909  | 1.422  | .504  | 4.011   |
| 07 | Spicy food                                | 64% | 54%   | 1.514 | .679  | 3.376  | 1.211  | .471  | 3.110   |
| 08 | Junk Food                                 | 68% | 56%   | 1.670 | .739  | 3.774  | 1.091  | .428  | 2.779   |
| 09 | Lack of regular Intake of Vegetables      | 32% | 20%   | 1.882 | .756  | 4.690  | .964   | .315  | 2.953   |
| 10 | Dieting                                   | 22% | 16%   | 1.481 | .540  | 4.064  | .917   | .290  | 2.902   |
| 11 | Immediate rest after dinner               | 28% | 22%   | 1.379 | .555  | 3.427  | .667   | .220  | 2.026   |

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