

Original Article

## Chemical stress as a consequence of prolong drug use, a study on chronic health condition.

*Dur-e-shahwar<sup>1</sup>, Shamoon Noushad<sup>2</sup>, Kisa Fatima<sup>2</sup> & Sadaf Ahmed<sup>1,2</sup>*

<sup>1</sup>Psycho-physiology research lab, Physiology Dept, University of Karachi.

<sup>2</sup>Advance Educational Institute & Research Center

Corresponding Author Email: [dureshahwar\\_khan@yahoo.com](mailto:dureshahwar_khan@yahoo.com)

### Abstract

**Background:** Chemical stress is an indication of increase or a lesser amount of chemicals that body has exposed both internal or external environment provided to single cell such as pollution, smoking, ingested food additives, pesticides, excessive consumption of sugar and alcohol, too many cups of coffee and even passive smoking cause chemical stress. This prolong exposure to any affluence can cause chemical stress that interferes with body's natural balance. **Methodology:** A cross sectional survey based study was conducted at a local hospital including 3 groups of patients, Group I was using only anti diabetic drugs, Group II was chronic user of cardiac medications while Group III was using both. Demographic data, medical history and drug use duration and dosage were investigated as well as intensity of Chemical stress was calculated by Sadaf stress scale. The patients with severe and psychological and mental illness or any other chronic illness or patients who were failed to provide reliable information were excluded from study. **Results:** The result showed that there is a stressful built-up of chemicals as a result of altered metabolism due to excess drugs use in these patients. However moderate stress is majorly reported in Group III that indicates increased number of prescribed medications and their correlation with intensity of chemical stress. However, none of the patient scored severe stress which is again an indication that there is a progressive psychophysiological deteriorating state rather than fully damaged that can be improved.

### Keywords

Chemical Stress, Sadaf Stress Scale, chronic medications, drug abuse

### Introduction

Chemical stress comes from toxin such as pollution, cigarette smoking, ingested food additives, pesticides, excessive consumption of sugar and alcohol, too many cups of coffee and even smokers in surroundings can indirectly causing chemical stress (Sadaf A. and Shamoon N., 2014) Even the continuous use of medications results in the build-up of chemicals in the body that will eventually exposed the body towards the chemical stress (N EngI J Med, 2012).

There are certain health conditions that can be controlled but not ameliorate i.e. chronic diseases or non-communicable diseases, to maintain these health condition continues use of medications is required (Jaff, J.C et al, University of Michigan, 2011) Chronic diseases and conditions—such as heart disease, stroke, cancer, diabetes, obesity, and arthritis—are among the most common, executive, and avertible of all health problems. (Ward BW, Schiller JS, Goodman RA., 2012). In 2012, half of all adults—117 million people—had one or more chronic health conditions.

Two or more chronic conditions were present in one of four adults. (Helmick CG, Theis KA, Arbour KE, et al.2010-2012). In 2010 seven of the top ten death causes was chronic condition. Two of these chronic diseases were heart disease and cancer—together accounted for nearly 48% of all deaths (Fryar CD, Chen T, Li X, 2010). Continuous use of chronic medications is essential in order to revamp the chronic health condition but results in the build-up of chemicals in body that will interfere with the body natural balance and produces different type of side effects, including dehydration, use of medications on regular basis, body temperature variation, insensitivity to heat or cold. In some cases, the side effects that are produced by chronic medications may worsen the health condition (Goldstein, D.S., and kopin, I.J., 2007).

The drugs adductors are more sensitive to chemical stress then the normal. This hypersensitivity may exist before the drug user start taking drugs and may contribute to their initial drug use, or it may occur as a result of effects of chronic drug abuse on the brain, or its existence could be due to a combination of both (St. John Sutton M, et al., 2002).

### Methodology

By conducting a survey, chemical stress among the patients who used anti diabetic and cardiac medications were found. A total of 114 patients have participated in the study, a questionnaire comprising of 23 questions were arranged for diabetic and cardiac patients. The sections of the questionnaires include demographic information, General information, and medications for diabetic and cardiac

patients, symptoms, perceived stress. The intensity of chemical stress is checked using first Pakistani stress scale i.e. Sadaf stress scale (SSS). Inclusion criteria of study involved diabetic and cardiac patients, taking diabetic and cardiac medications. Exclusion criteria of study include, with any severe and psychological and mental illness. Unable to provide inform constant, Individual does not have reliable information.

### Results

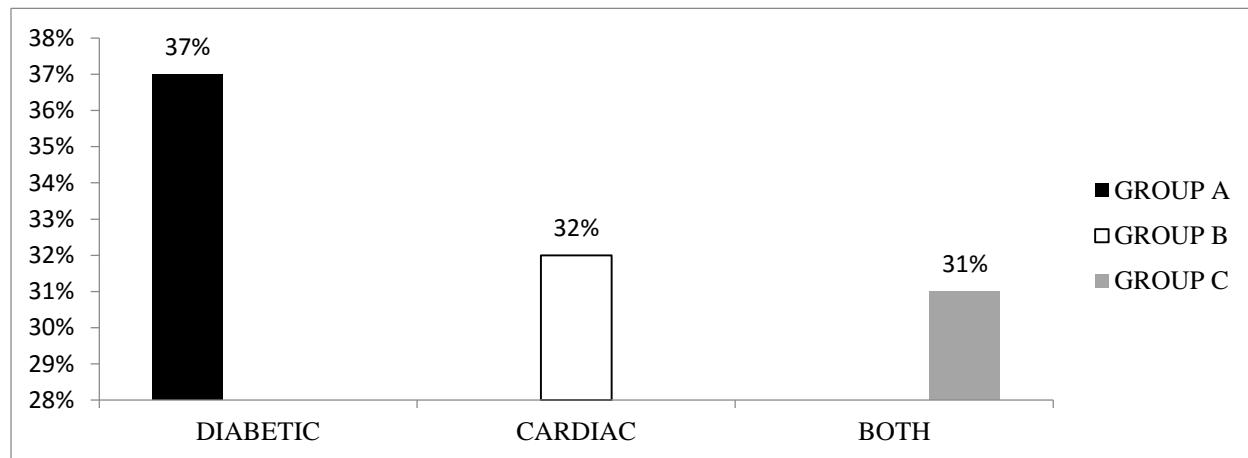


Fig.1 Showing the Total Number of Participants, Diabetic Patients i.e. Group A, Cardiac Patients i.e. Group B and Both i.e. Group C Participated. The present study was conducted using a total of 114 participants. In this population, 42(37 %) patients were diabetic; group A, 37 (32%) patients were cardiac; group B and 35(31%) were patients that have both diabetic and cardiac problem; group C. The in equal patient's distribution was due to the selection of subjects by consecutive sampling method.

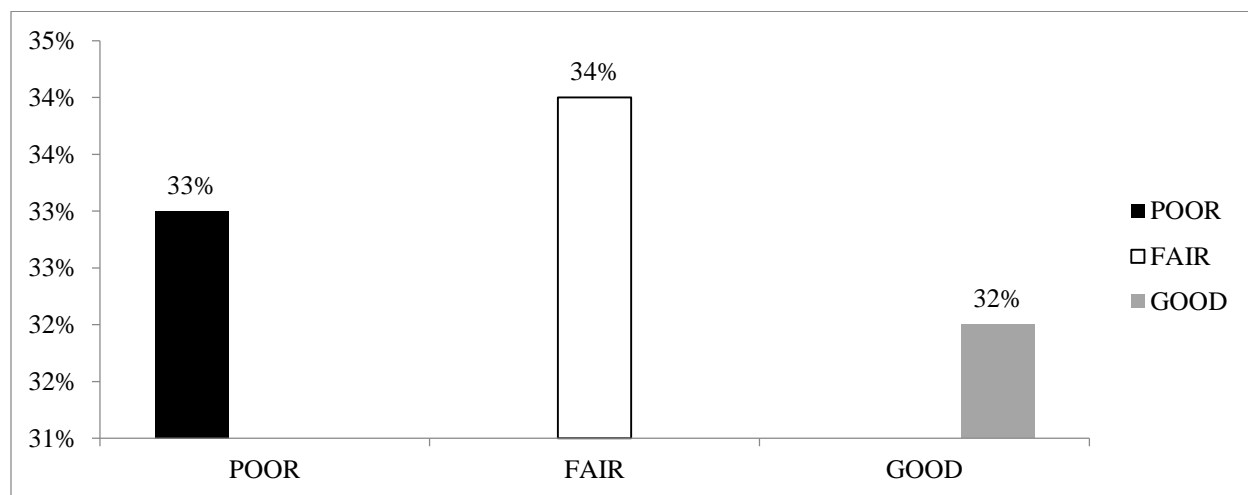


Fig.2 Showing the Overall Health of the Patients. The 33 % patients have reported poor health condition, 34% patient have reported fair health condition and 32% patients have reported good health condition.

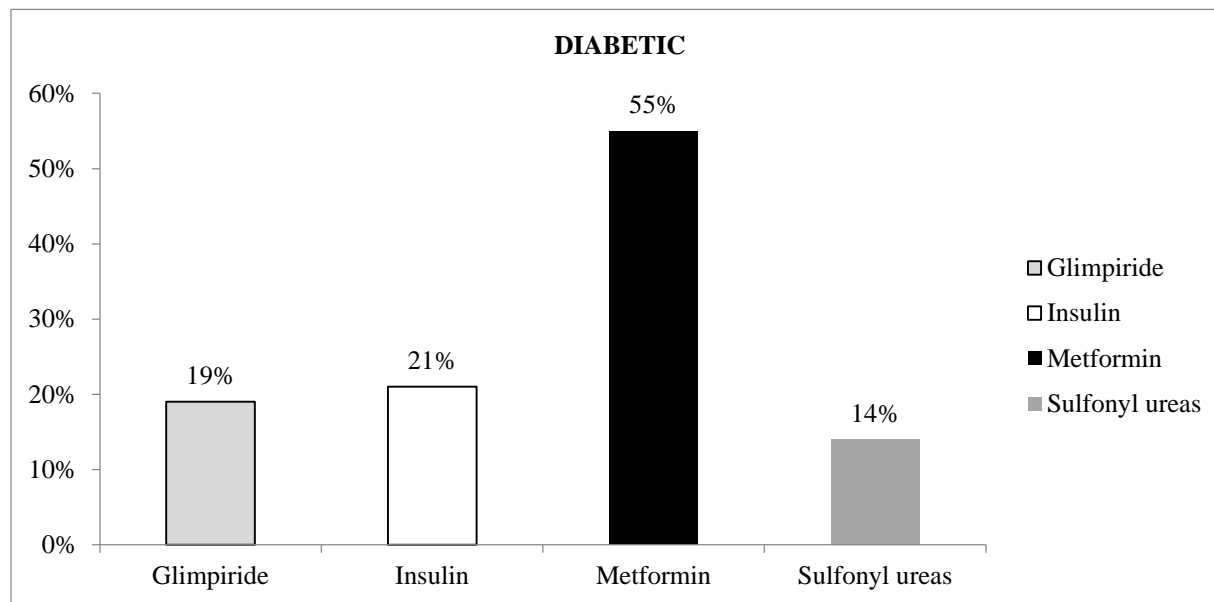


Fig.3 showing the Most Common Drugs that are given to Group A. (Diabetic). 19% of patients were using glimepiride, 21% of patients were using insulin, 55% of patients are using insulin and 14% were using sulfonylureas.

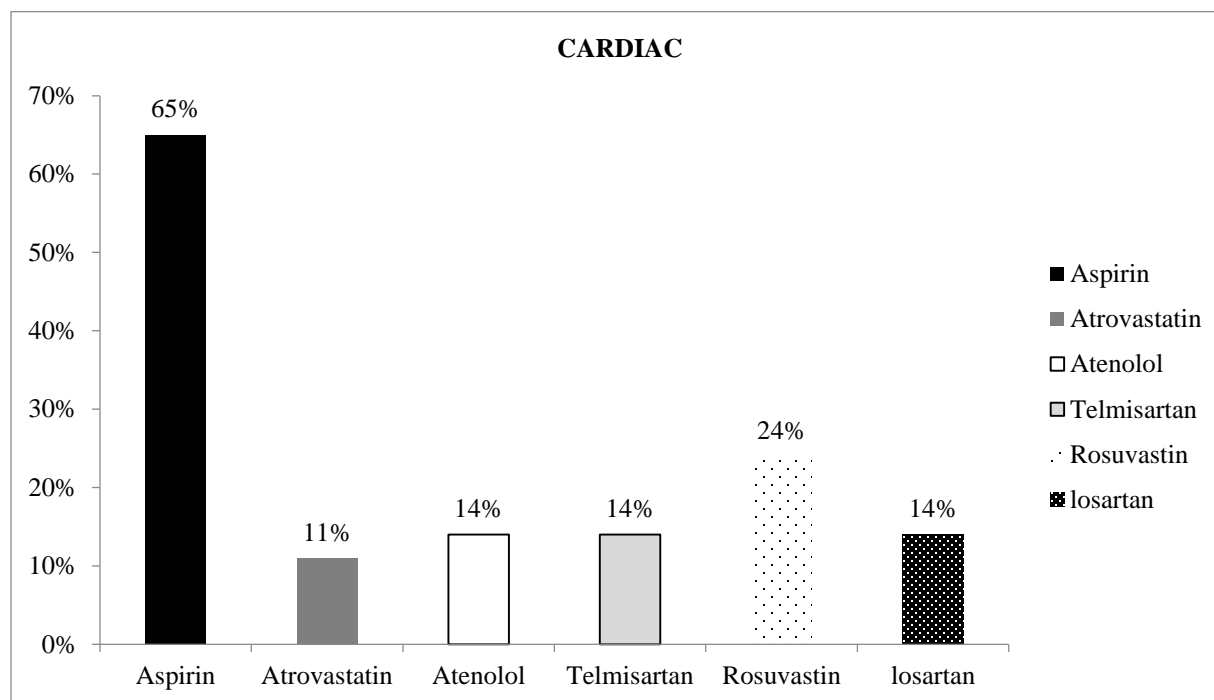


Fig. 4 Showing the Most Common Drugs that are given to Group B. (Cardiac). 65% of patients were using aspirin, 11% of patients were using atorvastatin, 14 patients were using atenolol, telmisertan and losartan, and 24% were using rosuvastatin.

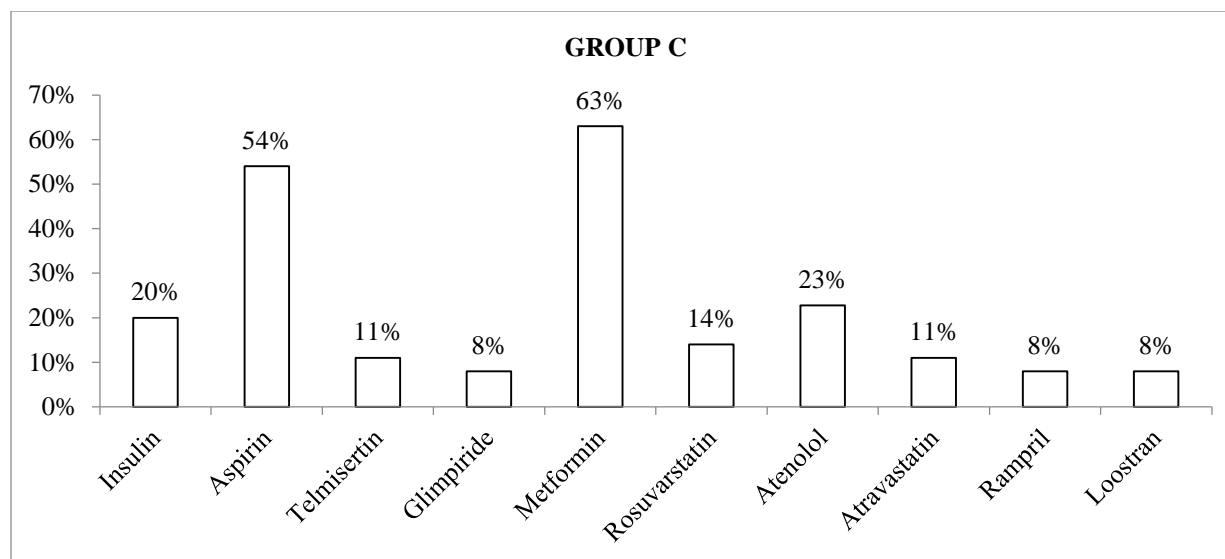


Fig.5 Showing the Most Common Drug that are Given to Group C.20% of patients were using insulin, 54% of patients were using aspirin, 11 % were using telmisertan, 8% were using glimepiride, 63% were using metformin, 14% were using rosuvastatin, 22.8% were using atenolol, 11% were using atorvastatin, 8% were using rampril and 8% were using loostran.

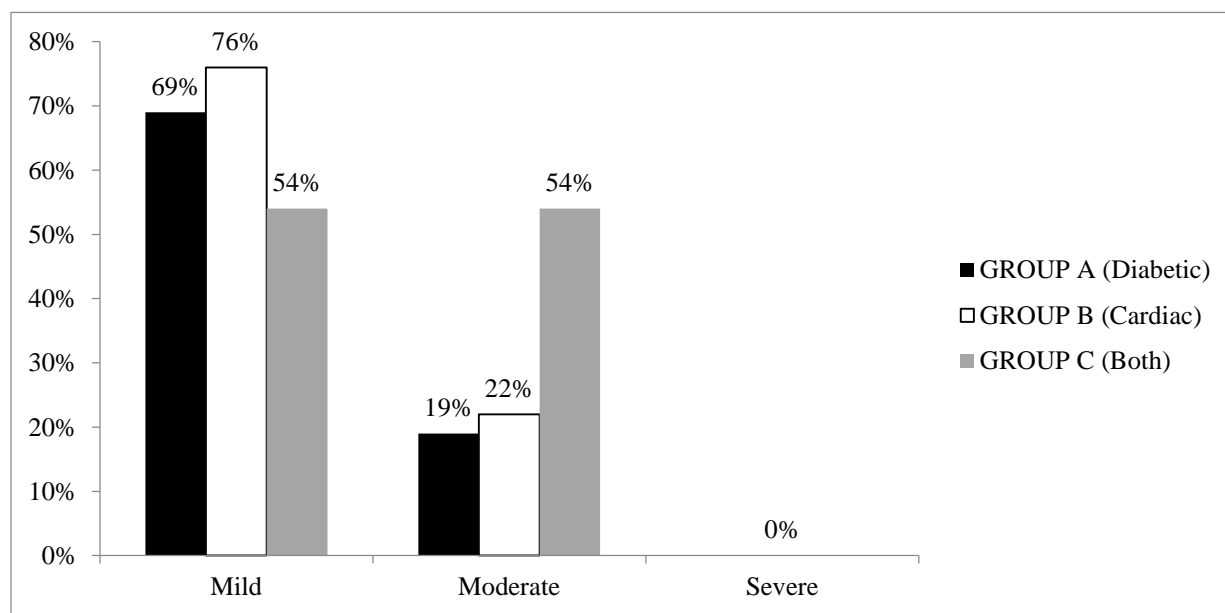


Fig.6 Showing the Comparison of Intensities Reported for Chemical Stress among the Three Groups of Patients, Group A (Diabetic), Group B (Cardiac), Group C (Diabetic and Cardiac). 69% of group A, 76% of group B and 54% of group C reported mild chemical stress. 19% of group A, 22% of group B and 40% of group C reported moderate chemical stress.

Table:1

CHEMICAL STRESS SYMPTOMS	GROUP A	GROUP B	GROUP C
Increased caffeine	82%	91%	80%
Use of medications on daily basis	100%	100%	100%
Body temperature variations	81%	91%	89%
Dehydration	88%	89%	86%
Shortness of breath	79%	94%	83%
Chest pain	66%	92%	89%
Irregular heart beat	78%	100%	89%
Hypersensitivity to food	69%	43%	69%
Insensitivity to cold/heat	81%	78%	91%

The most common symptoms of chemical stress that are reported in these patients are presented in table 1.

### Discussion

Chronic health condition pushes the patients to take high amount of chronic medications in order to maintain the chronic condition. The use of chronic medications improves chronic health condition but the continues use of these medications results in the chemical build ups in these patients and results in chemical stress (Handelsman Y., et al. 2011). The high level of chemical stress is reported in group C, having both diabetes and cardiac problem pushes the patients to take high amount of medicine, in order to maintain diabetes and cardiac problems, use of the high amount of medications develops the chemical stress in patients, that will produces symptoms of chemical stress such as taking medication on regular basis , dehydration, body temperature variations (Richard S., 2012).

In group A dehydration is mainly reported that occurs as a result of build of sugar in blood, when kidneys loss sugar through urine large amount of water is lost that results in dehydration (Alexandria, V.A., 2012). In group A Chest pain, irregular heartbeat, use of caffeine, are reported these are not the symptoms of

diabetes but reported in group A due to build-up of chemicals in body as a result of chronic medications use (Gaede P. et al, 2003). The most common symptom of chemical stress reported in cardiac patients are use of medicine on regular basis, irregular heartbeat, and chest pain is majorly reported Use of medicine on regular basis occur because of increased intensity of chemical stress (Chiasson JL, 2004).

Irregular heart beat and chest pain occur as a consequence of cardiac problems and chemical stress. The most common symptom of chemical stress reported in group C includes taking medicine on regular basis, irregular heart beat and chest pain These all symptoms occur as a result of build-up of chemicals in patient's body (Leroith D., 2012). In group A the most common medications that are given include, Metformin is an oral medication that is used to maintain blood glucose level normal (DeFronzo R.A., 1995). However, metformin produces a number of side effects that include, abdominal or stomach discomfort, cough or hoarseness, decreased appetite, diarrhea, fast or shallow breathing, fever or chills,

general feeling of discomfort, lower back or side pain, muscle pain or cramping, painful or difficult urination, sleepiness (Shaya FT, et al, 2010).

Insulin is taken by diabetic patients to keep the glucose levels in control. Side effects produce by insulin include weight gain, renal problem, gastrointestinal distress and allergies (Ohkubo Y, et al.,1995). Glimepiride, is medium-to long acting sulfonyl urea antidiabetic drug. Side effects produce by glimepiride include dizziness, headache, chest pain, abdominal discomfort (Shaya FT, et al, 2010). In group B majority of patient's uses aspirin, is used long term to prevent heart attacks, stroke, and blood clots forming. It also given immediately after heart attack to prevent another attack (Joffe H.V. et al, 2010). Aspirin also produces a number of side effects that include chest pain, itching, redness, swelling, bleeding (Wilson W. et al, 2007). Beta blockers are used to treat hypertension and chest pain but also produce side effects that include blurred vision, confusion and sweating (Jneid H,2012) The group C include the patients that have both the problems diabetes and heart problems, so these patients use high amount of medicine, most commonly used medicine includes metformin, aspirin, and insulin.

### Conclusion

By doing this study it is concluded that, chronic medications improve the chronic health conditions but also responsible to develop a large number of side effects that can be hidden in these patients and in some condition may worsen the chronic health conditions like give symptoms like dehydration, use of medicine on regular basis and irregular heartbeat. By conducting a cross sectional survey on chronic patient, it is concluded that chronic medications are also responsible for the development of chemical stress due to the use of medicine that results in the build-up of chemicals in body.

### Competing Interests

No competing interests were found in the preparation of this paper.

### Acknowledgement

The authors appreciate the contribution of all team members of psychophysiology research lab.

### References

- Alexandria, VA, American Diabetes Association. *Medical Management of Type 1 Diabetes*, 2012
- Chiasson JL. Acarbose for the prevention of diabetes, hypertension and cardiovascular disease

in subject with impaired glucose tolerance: facts and interpretation concerning the critical analysis of the STOP-NIDDM Trial data. *Diabetologia* 2004; 47:969-75; discussion 976-7

- DeFronzo R.A., Goodman A.M. Efficacy of metformin in patients with non-insulin dependent Diabetes mellitus. The Multicenter Metformin Study Group. *New England Journal of Medicine* 1995; 333
- Fryar CD, Chen T, Li X. Prevalence of uncontrolled risk factors for cardiovascular disease: United States, 1999–2010
- Gaede P, Vedel P, Larsen n, Jensen GV, Parving H., and Pedersen O. multifactorial intervention and cardiovascular problems in patients with type II diabetes. *N Engl J med* 2003; 348:383-393
- Goldstein, D.S., and Kopin, I.J. Evolution of Concepts of Stress: The International Journal on the Biology of Stress, 2007 10(2), 109-120.
- Handelsman Y, Mechanick JI, Blonde L, et al. American Association of Clinical Endocrinologist Medical Guidelines for Clinical Practice for Developing a Diabetes Mellitus Comprehensive Care Plan. *Endocrine Practice* 2011; 17 (supl. 2):1-52
- Helmick CG, Hootman JM, Brault MW, Theis KA, Armour BS. Prevalence and most common causes of disability among adults, 2005.
- Jaff, J.C., Stoll, S.C., Ko, Y., Youatt, E., Netkin-Collins, N., & Clark, N.M., University of Michigan, 2011. Living with chronic illness: A prescription for advocacy
- Jneid H, Anderson JL, Wright RS, et al. ACCF/AHA Focused Update of the Guideline for the Management of Patients with Unstable Angina/Non-ST-Elevation Myocardial Infarction, 2012; 126.
- Joffe HV, Parks MH, Temple R. Impacts of Cardiovascular Outcomes on the Development and Approval for the Medications for the Treatment of Diabetes Mellitus. *Reviews in Endocrine and Metabolic Disorders* 2010; 11:21-30
- Leroith D, pathophysiology of metabolic syndrome: implications of cardio metabolic risk associated with type II diabetes. *Am J Med Sci* 2012; 343(1):13-16
- N Engl J Med. The Action to Control Cardiovascular Risk in Diabetes Study G. Effects of Intensive Glucose Lowering in Type II Diabetes 2008; 358:2545-59
- Ohkubo Y, Kishikawa H, Araki E, et al. Intensive insulin therapy prevents the progression of diabetic microvascular complications in Japanese

- patients with non-insulin dependent diabetes mellitus: a randomized prospective 6-years study, 1995; 28:103-117
- Richard S. Beaser, Joslin's Diabetes Desk book 3<sup>rd</sup> edition: 29-50, 2014
  - Sadaf A. and Shamoon N., Psychophysiology of Stress, 2014; 91-100
  - Shaya FT, et al. US trends in glycaemic control, treatment, and comorbidity burden in patients with diabetes, 2010:826-832
  - St. John Sutton M, et al. A comparison of effect of Rosiglitazone and Glyburide on Cardiovascular Function and Glycaemic Control in Patients with Type II Diabetes. Diabetes Care 2002; 25:2058-2064
  - Ward BW, Schiller JS, Goodman RA. Multiple chronic conditions among US adults: a 2012 update. *Prev Chronic Dis*. 2014
  - Wilson W, Taubert KA, Gewitz M, et al American Heart Association AHA, Dallas, Texas, 2007; 116:e376-7