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Retrospective Analysis of Metabolic Syndrome, Risk Factors and Therapeutic Approach: A Study among Patients of Malwa Region

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ABSTRACT

Metabolic syndrome is illustrated by the concur of several cardiovascular risk factors including insulin resistance, central obesity, visceral adiposity, atherogenic dyslipidemia and hypertension. The proposed study was conducted on 133 patients within the course of 6 months from various region of Malwa. The data was collected using patients' diagnostic reports, prescriptions and medical history and was separately studied using Microsoft excel 2009 spread sheets. A total of 133 patients were enrolled for this study. 46.7% were already suffering from Metabolic disorder remaining 53.3% patients were at risk of it. Group II patients were detected with high level of triglyceride, uncontrolled diabetes, hypothyroidism besides stage II hypertension, ischemic heart disease and angina pectoris. In Group I T2DM, hyperthyroidism, hypertension besides acute myocardial infraction and Angina was identified. Whereas in Group III patients, angina pectoris was dormant in addition to cardiovascular diseases, ischemic heart disease and acute myocardial infraction. Antacids, antidiabetic, antihypertensive, diuretics, vitamins, statins, glucocorticoids, non-steroidal anti-inflammatory drugs were preferably prescribed medications. Certain class of medication were found to influence risk of metabolic syndrome due to their Adverse drug reaction. Delayed identification and certain Adverse drug reaction were identified by reviewing medication grids. Multi-fold domain such as genetic, behavioral, lifestyle and clinical factors also contributed in metabolic syndrome. Therefore, health care professionals, pharmacist, patients and caregivers need to collaborate and explore better behavioral, healthy lifestyle and safer medications to avoid the additional complicity and breakthrough of Metabolic syndrome.

Keywords: Metabolic Syndrome, World health Organization, T2DM, Adverse drug reaction, Hypothyroidism, Crucial Diagnostic Analysis.

INTRODUCTION

Metabolic Syndrome (MS), is a major and common public-health issue and clinical challenge worldwide in the wake of urbanization, surplus energy intake, increasing obesity, and sedentary life habits.[1] MS confers a 5-fold increase in the risk of type 2 diabetes mellites (T2DM) and 2- fold the risk of developing cardio vascular disease (CVD) over the next 5 to 10 years. The etiologies are proposed to be multi-factorial, including diet pattern, genetic predisposition, ethnicity.[2] Further, patients with the MS are at 2- to 4-fold increased risk of stroke, a 3- to 4- fold increased risk of Myocardial Infraction (MI), and 2-fold the risk of dying from such an event compared with those without the syndrome. Regardless of a previous history of cardiovascular events. A version of MS has a WHO International Classification of Disease (ICD-9) code (277.7) which permits healthcare reimbursement.[3] MS is associated with fallowing risk factors (Figure 1).

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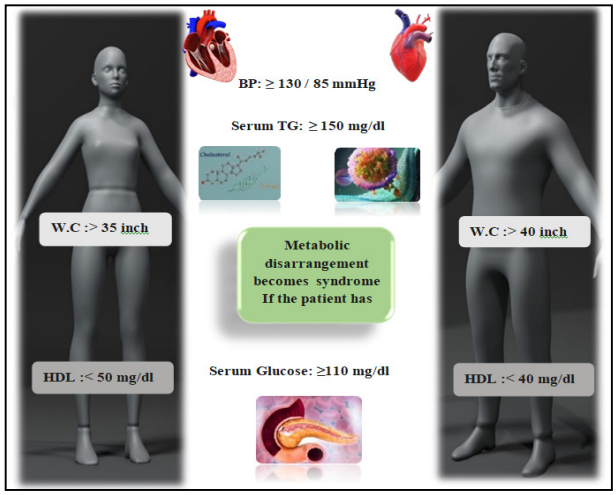

The magnitude of the increased risk can vary according to which components of the syndrome are present plus the other, non-MS risk factors in a particular person.4 MS is also known as 'hyper triglyceridemic waist', 'deadly quartet' and 'insulin resistance syndrome', which is recognized as cardiovascular risk factor.[5] It is an assemblage of several metabolic abnormalities, that are interlinked with physiological, clinical, biochemical and metabolic factors,[3] that possess the ability to directly enhance the risk of hypertension, central obesity, insulin resistance, T2DM, all-cause mortality, visceral adiposity, atherogenic dyslipidemia, endothelialdysfunction, genetic susceptibility,hyper-coagulablestate, vascular and neurological complications such as a cerebrovascular accident, smoking, atherosclerotic and nonatherosclerotic CVD as well as chronic stress are different factors which contribute to the syndrome. There is a strong association between MS and T2DM.[6] For patients with established T2DM, clinical trials confirm a reduction in cardiovascular risk from treatment of dyslipidemia and hypertension.[7-11] Glycemic control to a hemoglobin A1c of <7% reduces microvascular complications and may decrease risk for macrovascular disease as well.12 A close link exists between T2DM and CVD, which is the most prevalent cause of morbidity and mortality in diabetic patients.[12]

Inflammation is another component of MS raises the possibility that this is an additional process that links MS to CVD risk.[13-15] Inflammation is generally linked with the visceral obesity and insulin resistance thus illustrated by production of abnormal adipocytokines including, tumor necrosis factor α interleukin-1 (IL-1), IL-6, leptin, as well as adiponectin.[16] The most widely used criteria at present for defining the MS is given by various standard organizations such as World health Organization (first developed in 1998, by Albert and Zimmet, 1998), The European Group of study of Insulin Resistance, Balkauand Charles, 1999, proposed a modification to the WHO definition, The National Cholesterol Education Program Adult Panel III in 2001 devised a definition which was updated by the American Heart Association and the National Heart Lung and Blood Institute in 2005, International Diabetes Federation (IDF); published new criteria for metabolic syndrome and American Association of Clinical Endocrinologists (AACE).[16] According to WHO, "MS is the presence of insulin resistance (impaired fasting glucose, impaired glucose tolerance, or T2DM in addition to two of the following risk factors: obesity (waist–hip ratio or body mass index), hyperlipidemia (hyper triglyceridemia, low high-density lipoprotein [HDL] cholesterol, hypertension, or micro albuminuria. MS is defined by any of the above criteria, remains a predictor of atherosclerotic CVD.[17-22] In the effort to introduce the MS into clinical practice, several organizations have attempted to formulate simple criteria for its diagnosis.4 fallowing are the organization provides the criteria to define the MS (Table 1).

Table 1: Definition of Metabolic Syndrome as per several standard organizations.

Clinical measure	World health Organization 1998 (mg/dL, mm Hg)	European group for the studyof Insulin 1999 (Cm, mm Hg, mg/dL)	Adult treatment panel III for the National Cholesterol education program 2001 (Cm, mmHg, mg/dL)	International diabetes federation 2005 (Cm, mm Hg, mg/dL)	American heart association/ National heart, lung and blood Institute 2005(Cm, mmHg, mg/dL)

Criteria	IRandany other 2	IR and any other 2	Any 3 or 5	Increased WC + any 2 others	Any 3 or 5
Body weight	Men: Waist-to-hip ratio ≥0.90; Women: Waist-to-hip ratio ≥0.85 and Waist-to-hip ratio >0.90;	WC: Men: ≥90cm Women: ≥80 cm	WC: Men: ≥102cm Women: ≥88 cm	WC: Men: ≥90cm Women: ≥80 cm	-
Insulin resistance	IFR/ IGT IR	Plasma Insulin >75%	-	-	-
Blood Glucose	IGT T2DM	IGT	≥110mg/dl; including diabetes	≥100 mg/dl	100mg/dl; including diabetes
Dyslipidemia	TGs≥150 mg/dLand/or HDL-C Men<35 mg/dL Women<39 mg/dL	TGs≥150 mg/dL and/or HDL-C Menor Women <39 mg/dL	TGs≥150 mg/dL HDL-C Men<40 mg/dL Women<50 mg/dL	TGs ≥150 mg/dL HDL-C Men<40 mg/dL Women <50 mg/dL	TGs ≥150 mg/dL HDL-C or on TGs Rx. Men<40 mg/dL Women<50 mg/dL Rx
Blood Pressure	≥140/ 90 mm Hg	≥140/ 90 mm Hg or on risk of hypertension	≥130/ 85 mm Hg	≥130/85 mm Hg	≥130 mm Hg systolic and ≥85 mm Hg diastolic or on hypertension Rx
Other	Microalbuminuria	-	-	-	-

BMI, body mass index; HDL-C, high-density lipoprotein cholesterol; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; IR, insulin resistance; T2DM, type 2 diabetes mellitus; TG, triglycerides; WC, waist circumference. (Adapted from the American Heart Association/National Heart, Lung, and Blood Institute report).

Several medications have been used as the first line medications for the management of MS, including antihypertensive, antidiabetics, antilipidemic, vitamins, statins for dyslipidemia, renin-angiotensin-aldosterone system inhibitors for arterial hypertension, metformin or sodium/glucose cotransporter 2 inhibitors or glucagon-like peptide 1 receptor agonists (GLP-1RAs) for glucose intolerance, as well as GLP-1RA liraglutide for achieving body weight and waist circumference reduction.[23-24] Topiramate is a novel broad-spectrum anticonvulsant drug used in children and adults. Medications that preferably used for type 2 diabetes (antidiabetics) include Metformin, Sulfonylureas, Gloxazone, Glinides, Gliptins (dipeptidyl peptidase-4 inhibitors), Gliflozins (SGLT2 inhibitors).[25] The use of certain medications to treat diabetes, thyroidism, lipidemia, ischemic heart disease and CVD may increase the risk of the MS by either promoting weight gain or altering lipid or glucose metabolism.[24] Often accompanying this weight gain are worsened health risks, including an increased incidence of the MS, type 2 diabetes, and other cardiovascular risk factors with many drug classes,[25-28] such as thiazides, beta blockers, insulin analogs, sulfonylurea, thiazolidinediones, calcium channel blocker, glucocorticoids, vasodilators, NSAID's, antidepressants.[29-30]

This proposed investigation was aimed to retrospectively analyze the diagnostic and treatment decisions as well as most preferred drugs and adverse drug reaction associated with the treatment provided to the patients who were at the risk or suffering from MSs with what has been published in the past.[31-33] As this study is essential and will also facilitate the health care professional to identify the risk factors (most affected age group, gender, various individual diseases, hormonal physical and mental health as well as the life style) of MS and associated ADR with certain drugs or therapy besides to provide the foremost better treatment with less adverse effects and less probability of MS emergence due to other related causing disease and drug of therapy.[24]

MATERIALS AND METHODS

Sites and design of the case study

The proposed existential study was assisted to analyze within the course of 6 months (February 2022 – August 2022) involving the patients suffering from metabolic disorder and by major risk factors of MS (CVDs, AMI, Hyperlipidemia, Diabetes, blood pressure, IHD, angina pectoris and Thyroid) in Malwa Region.

Size of the Specimen

The specimen size involved in the study, includes 133 patients, considering both male and female patients from various region of Malwa like indore, dewas and shajapur. Total of 133 patients were divided in three groups; Group I: 20-40 years of age, Group II: 40-60 years of age and group III: more than 60 years of age (elderly patients). The patients whose data was not sufficient enough were excluded from the study. The method used in sampling was random sampling with 95% accurate sampling and expected ±5% error margin throughout the sampling process.

Analysis of the collected data

The data was collected for the proposed study involves usual prerequisite test (Generalized diagnostic analysis) and special test based on severe symptoms. The below data were collected from the patient's prescriptions as well as their medical history and was separately studied using Microsoft excel 2009 spread sheets.

Generalized Diagnostic analysis: Name, year of diagnosis, gender, age, body weight, body temp, BP, Pulse, SPO2, complete blood count, SPO2, Hb, HBA1C, SGPT, CRP, M.C.H.C, serum creatinine, Risk ratio and urine examination.

Crucial diagnostic analysis: the crucial diagnostic test was performed based on the results of usual prerequisite test for the confirmation of metabolic disease (Table 2).

Table 2: Diagnostic parameter for individual risk factors.

S. No	Disease	Diagnostic parameters
1	T2DM	RBS, FBG, PPBG
2	Hyperlipidemia	Serum triglyceride, Serum LDL, Serum HDL, Serum VLDL, LDL/HDL
3	Hypertension	Electrocardiogram
4	Hyperthyroidism	T3, T4, TSH
5	Hypothyroidism	T3, T4, TSH
6	CVD	Electrocardiogram, CRP, Triglyceride
7	IHD	Electrocardiogram, Coronary angiography
8	Angina pectoris	SerumTriglyceride, Electrocardiogram,Coronary angiography
9	AMI	Serum Triglyceride, Electrocardiogram

T2DM: type 2 diabetes mellites, CVD: cardiovascular diseases, IHD: Ischemic heart diseases, AMI: Acute myocardial infraction, RBS: Random blood sugar, FBG: fasting blood sugar: PPBG: Postprandial glucose, LDL: Low Density Lipoprotein, VLDL: Very Low-Density Lipoprotein, HDL: High Density Lipoprotein, T3: Triiodothyronine, T4: Thyroxine, TSH: Thyroid-stimulating hormone.

Treatment Analysis Approach

It was initiated by collection and setup procedure of patient medical history including their prescriptions and then deep study and understanding of the prescribed medicine which includes the API categories its therapeutic effect and most importantly ADR which is a major indicative contribution factor in causing MS to the patients who were already at the risk of MS using Microsoft excel 2009 spread sheets.

The collected data was retrospectively analyzed and categorized as follows:

Disease wise analysis

Disease wise analysis includes differentiation of patients who were prescribed firstly with the therapeutic drugs intended to treat major disease occurs for the first time (primary) and the patients who were prescribed with the therapeutic drugs intended to either manage the expected adverse drug event, reaction or to treat the other associated diseases.

Primary disease

Associated disease

Therapy wise analysis

Therapy wise analysis includes the deep and precise study of dosage form containing the therapeutic active pharmaceutical, this therapeutic active pharmaceutical compound was further differentiated into two sub categories known as Monotherapy and combination therapy.

Mono therapy

It is characterized by the single API per dosage form.

Combination therapy

It is characterized by the multiple API in single dosage form.

RESULTS

Diagnostic Analysis

Allover 133 patients' diagnosis and prescription were investigated and analyzed thoroughly. Out of 133 patients, 62 patients were already suffering from Metabolic disorder, remaining 27 patients were having T2DM (T2DM), 05 Hyperlipidemia, 15 hypertension, 01 hyperthyroidism, 05 hypothyroidism, 01 CVD (CVD), 06 ischemic heart disease (IHD), 07 Angina pectoris and 04 Acute myocardial Infraction (AMI) as shown in (Figure 2).

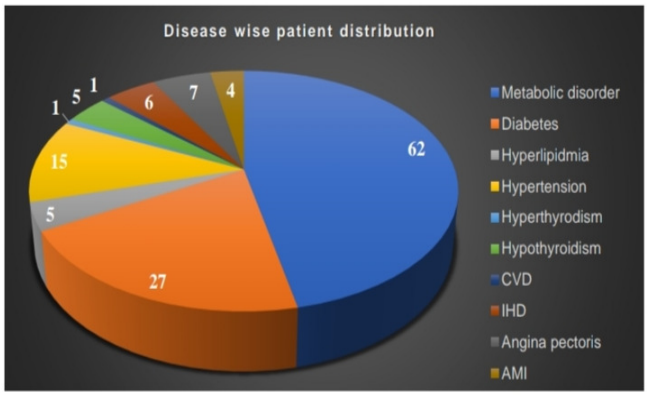

Figure 2: Disease wise patient classification.

As per the study protocol Total of 133 patients were divided in three groups in which group II shown the dormancy of risk factor with total 65 patients and among which 32 (maximum number) of patient were suffering from metabolic disorder as compared to Group III patient with average count of 25 metabolic patients as well as Group I of young patient which have lesser number of patients (5) suffering metabolic disorder as well as least number of patients (8) at risk of metabolic disorder (Table 3).

Table 3: Group- wise differentiation of patients

Disease	Age wise patient categorization into 3 Groups (n=133).		
	Group I (20-40 years)	Group II (40-60 years)	Group III (< 60 years)
Metabolic disorder	05	32	25
T2DM	02	12	13
Hyperlipidemia	00	05	00
Hypertension	01	07	07
Hyperthyroidism	01	00	00
Hypothyroidism	01	04	00
CVD	00	00	01
IHD	00	03	03
Angina pectoris	02	01	04
AMI	01	01	02
Total	13	65	55

Patient belonging to Group II have the prominent increased Random blood sugar, fasting blood glucose and postprandial blood glucose as compared to Group I and III patient's (Figure 3).

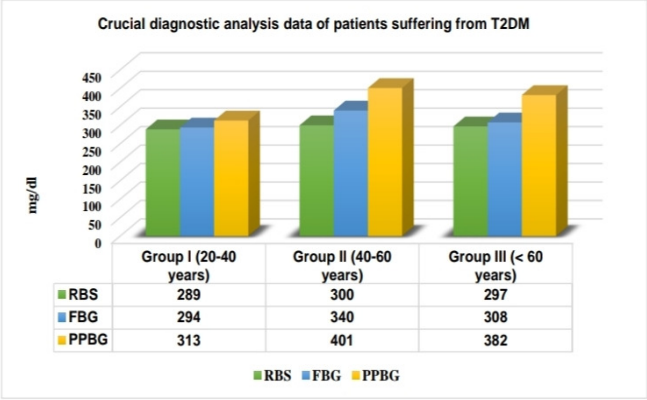

Figure 3: Analytical data showing the maximum RBS, FBG and PPBG.

Diagnosis of Hyperlipidmic patients revels the highest level of serum triglyceride (462 mg/dl) in Group II patients where as the level of Serum triglyceride in Group I and III is 359 and 450 mg /dl resepctiviely. The analytical results of Serum Triglyceride, Serum HDl, Serum LDL and VLDL are shown (Figure 4).

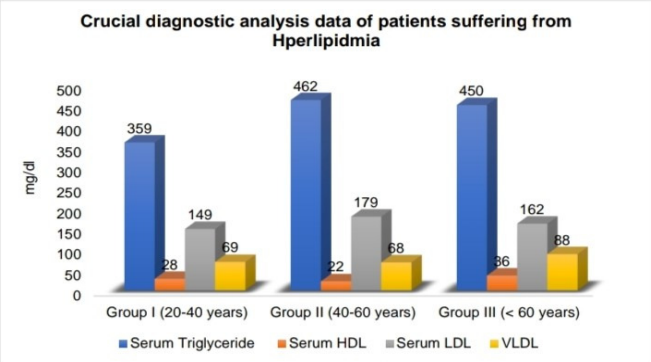

Figure 4: Analytical data representing serum LDL, HDL, VLDL and triglyceride levels among different age groups.

In BP test, it was found that Group II patients are at the stage II hypertension and some of Group III patients are at different (Prehypertension, stage I or stage II) stages of hypertension, whereas interestingly the patients belonging to stage I are having the normal BP ranges (Figure 5).

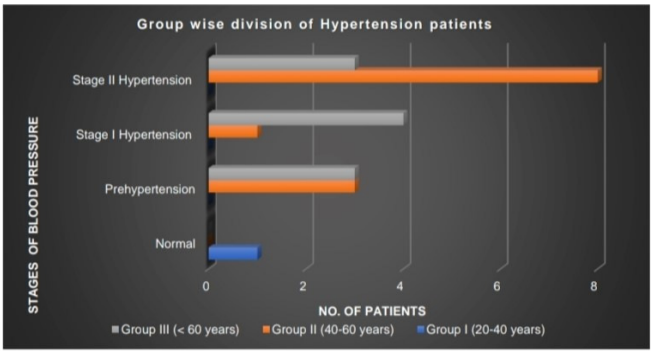

Figure 5: Analytical data showing patients at different stages of hypertension.

Hyperthyroidism is found only in 1 patient belonging to group I whereas Hypothyroidism is prominent in patient of group II and III (Figure 6).

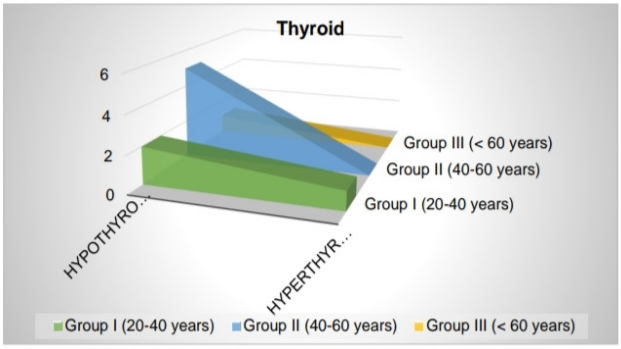

Figure 6: Differentiation of patients suffering from hypothyroidism and hyperthyroidism among different age groups.

Treatment based Analysis

It involves the analysis and study of all the prescribed medications mentioned in overall prescriptions of the patients. The analysis approach encompasses disease wise (metabolic disorder and solitary disease) sequential discrimination of patients along with the patients who were prescribed with discrete (medicines belonging to single category) and combination type therapy (medicines belonging to multiple therapeutic categories) the therapeutic approach detailed (Table 4).

Disease	Major primary disease	Therapy: Monotherapy or Combination therapy/ Dosage unit	Medication Therapy	
			Majorprimarydisease medications (Mg: milligram)	Associated disease/ ADR management drugs
Treatments of Metabolic Disorder	Type2 diabetes mellites	Monotherapy	Dapagliflozin	Metoprolol
		Combination therapy	Metformin + Glimepiride,	Rosuvastatin +Asprin+ clopidogrel
	Hyperlipid emia	Monotherapy	Atorvastatin, Clopidogrel, Ezetimibe	Perindopril Erbumin, Metoprolol succinate
		Combination therapy	Derrous ascorbate + folic acid, Rosuvastatin + vitamin D3, Rosuvastatin + clopidogrel + asprin, Atorvastatin + Asprin,	Al hydroxide + = dimethicon Domperidone + + omeprazole Amlodipine+ telmisartan Metformin+ glimepiride
	Hypertension	Monotherapy	Metoprolol Succinate, Nicorandil, Trimetazidine, Bisoprolol, Isosorbide mononitrate, Isosorbide dinitrate, Enalapril, Ramipril, Verapamil	Atorvastatin, Clopidogrel, Ezetimibe, Doxycycline, Hydrochlorothiazide, Rosuvastatin, Doxycycline,
	Type 2 diabetes mellites	Monotherapy	Vogliboss, Glimepiride, Metformin,Insulin Glargine, Glipizide	Vildagliptin, Methyl Cobalamin.
		Combination therapy	Metformin + glimepiride, Metformin (500 mg) + Vildagliptin, Gliclazide and Metformin	
	Hyperlipidemia	Monotherapy	Clopidogrel, Simvastatin, Etorcoxib, Ezetimibe	Metoprolol,

			Rosuvastatin + vitamin D3 Rosuvastatin + clopidogrel + Aspirin, Atorvastatin + Aspirin,	Al hydroxide + Simethicone + Magnesium hydride Metformin+ glimepiride, Amlodipine+ telmisartan,
	Hyperthyroidism	Monotherapy	Levo-Thyroxine,Linezolid and Hyoscine Butyl bromide	–
		Combination therapy	-	Mefenamic Acid 50mg + Paracetamol + Clarithromycin, Esomeprazole +Amoxicillin
	Hypothyroidism	Monotherapy	Thyroxine,	Cefixime, Acetaminophe n,calcium carbonate, Flunarizine,
		Combination therapy	Tri-iodothyronine + Tyroxine, Pyridoxine+cyanocobalamin+ nicotinamide + zinc + lysin, Tri-iodothyronine + thyroxine + Ergocalciferol D2 + cholecalciferol D3 + Alfacalcidol	Methyl cobalamin+ alpha lipolic acid, Methyl cobalamin+ Acetylcystein
	Hypertension	Monotherapy	Telmisartan, Propranolol, Amlodipine, Amitriptyline, Metoprololsuccinate, Topiramate, Azelnidipine, Moxonidine Dexamethasone, Efonidipine	Benzodiazepine, Pantoprazole, vitaminB7, Metronidazole, Pheniramine,
		Combination therapy	Metoprolol + Amlodipine + Calcium citrate Efonidipine (40 mg) +Amitriptyline++ Chlordiazepoxide, Telmisartanand Amlodipine,	Vitamin D3+ Folic Acid, Potassium chloride + sodium bicornate + Sodium chloride Amitriptyline +Mecobalamin, Naproxenand domperidone, Domperidone and Rabeprazole.
				Levodopa and Carbidopa
	CVDs	Monotherapy	Atorvastatin, Metoprolol, Nicorandil	
	Ischemic heart disease	Monotherapy	Metoprolol,Ramipril, Rosuvastatin, Ticagrelor, nebivolol	
		Combination therapy	Atorvastatin + clopidogrel + acetylsalicylic acid, Glyceryl trinitrate + nitroglycerine , Enalapril +propranolol, Atorvastatin + Aspirin, Spironolacton e + torsemide	
	Angina Pectoris		Ticagrelor, Atorvastatin, Metoprolol,enoxaparin sodium, Telmisartan, Verapamil, Amlodipine, Eplerenone,	Atorvastatin + asprin Amlodipine and Bisoprolol,

DISCUSSION

The global burden and risk of MS due to various factors such as bad life style, habits, genetic factors and medications is increasing rapidly. The discussion explains the outcomes of diagnostic parameters and deep study of preferred medications mentioned in collective prescription of 133 patients and risk of MS that occurred due to the adverse drug reaction of medication taken for the management of other diseases, which will ultimately facilitate health care providers in achieving effective and better treatment therapy.

Our Diagnostic study showed that maximum patients aged between 40-60 years (Group II) are having uncontrolled diabetes as their RBG, PPBG and FBG (300, 401and 340) respectively which is prominently increased and most of the patients are having low levels of all the above as well as the same age group patients (Group II) bearing high levels of triglyceride (462 mg/dl) who are certainly at a major risk of CVD or strocks as comapired to elder and younger patients with 450 and 359mg /dl respectively. Similarly, it was found that 8 patients of Group II are at the stage II hypertension and some of Group III three, four and three patients are

at different (Prehypertension, stage I or stage II) stages respectively, whereas interestingly one patient belonging to stage I are having the normal BP ranges Hence, hypertension is revealed as major risk factor among the studied cases. The dormancy of hypothyroidism is found in group II and III patients whereas Hyperthyroidism is found only in 1 patient belonging to group I. the study founds only 1 patient of group III, suffering from CVD, 3 patients of each group II and III suffering from IHD. The study also reveals that 4 patients of Group III, 1 patients of Group II and 2 patients of group I were already suffering from angina pectoris and are at risk of heart attack or stroke which will ultimately cause MS in future. Our study also showed that patients within group II had highest prevalence of MS.

Preferred medications

This section of our investigation involves the classification of study of frequently and preferably prescribed medications for the treatment of particular disease or conditions and some of the medications were given for the management of side effects that may be produced by consuming the primary therapy including, antacids, antidiabetic, antihypertensive, diuretics, vitamins, statins, glucocorticoids, NSAID's (Figure 7).

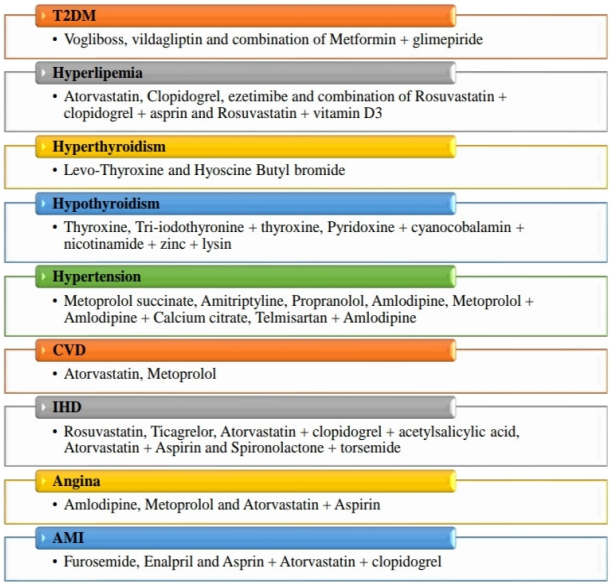

Figure 7: classification of study of frequently and preferably prescribed medications for the treatment of particular disease or conditions.

Risk of metabolic disorder due to adverse drug reaction

According literatures prescribed medications for the management of certain disease may cause or influence the risk of MS due to their adverse drug reaction, below are some drugs that has been prescribed to the patients and further cause other associated disease as well as enhance risk of MS in an individual. In our studies, out of 133 patients, some of the patients were taking medications such as:

Sulfonylureas

Gliclazide, Glimepiride, Glipizide which is associated with weight gain upto 2 and 2.3 kg by stimulating pancreas to release insulin as more insulin turns more blood sugar into fats.

Thiazides

Hydrochlorothiazide has the ability to increase the total cholesterol, LDL and triglycerides, especially at high doses.

Insulin

Insulin lispro solution, insulin lispro protamine suspension, insulin glargine coverts the glucose into fats that ultimately increase the weight and enhancing the risk of MS.

Beta blockers

Beta blockers are known to cause the weight gain upto 1.2 kg as compared to controls in research it was found that there is increase in 3 or more after one year of treatment. Whereas Metoprolol and Propranolol are associated with a worsening of glycemic and lipid parameters. Nonselective and β1-selective β blockers have little effect on total cholesterol and LDL-C levels but lead to a reduction in HDL-C and increased triglycerides. In

Calcium channel blockers

Verapamil, Diltiazem, Amlodipine, Azelnidipine and Efonidipine, which impair glucose metabolism. Verapamil having the ability to inhibit second phase of glucose - stimulated insulin release as well as inhibits sulfonylurea and glucagon - induced insulin secretion which ultimately increase the risk of diabetes.

Glucocorticoids

Dexamethasone, is known to increases the hepatic glucose production, insulin resistance, expression of peroxisome proliferator activated gamma receptors (PPAR-gamma).

Nonsteroidal Anti-Inflammatory Drugs and Analgesics

Asprin, use produces a clinically significant increment in mean BP of 5 mm Hg.

Antidepressants

Amitriptyline and monoamine oxidase inhibitors are associated with greatest weight gain. the selective serotonin reuptake inhibitors, Paroxetine is most likely to cause weight gain.

CONCLUSION

This investigational study significantly reveals the factuality that there is a strong association or interconnection between T2DM, hypertension, dyslipidemia, thyroidism and other related cardio vascular diseases. Association of any above disease enhance the risk or cause MS either physiologically, clinically or due to adverse effect of certain prescribed medication. The diagnostic parameter suggests that out of 133 patients 62 patients were already in misery of MS and 71 patients were at high risk of MS who need immediate intensive care to control the multiple risk factors. Early detection of these risk factors may help health care professional to prescribe better medication constituting higher efficacy and less adverse effects and this can be more achievable by patients' effective life style modification including special endorsement on moderate intensity physical activity, behavioral changes and nutritional therapy by increasing the intake of whole grains, legumes, veggies and fruits instead of fats, simple sugar and glycemic food which will ultimately lack the risk of MS to be pervade. The clinical management of MS is challenging due to lack of predetermined methods and strategies. In current scenario the health care professionals and medical practioners adopt separate treatment approach of individual diseases. This approach results in producing adverse effects of certain medications which will be the cause of numerous other metabolic diseases. Therefore, it's principal requisite for the health care professionals and pharmacist to collaborate and resolve the unresolved problems by identifying the contribution of genetic, behavioral, lifestyle and clinical factors in MS also need to explore and prefer the alternative of those prescribed medications owing the ability to bring on metabolic disease by virtue of adverse drug reaction for both forbearing of MS along with patients who are at peril of MS.

Conflicts of Interest: The authors declare that there are no conflicts of interest.

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