Diabetes & Metabolic Syndrome: Clinical Research & Reviews 13 (2019) 925–931

Contents lists available at ScienceDirect

Diabetes & Metabolic Syndrome: Clinical Research & Reviews

journal homepage: www.elsevier.com/locate/dsx

Original Article

Assessment of hazardous elements of metabolic syndrome in hypertensive patients to defend them from cardiovascular risk in tribal region

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ARTICLE INFO

Article history:
Received 26 November 2018
Accepted 19 December 2018

Keywords:
Hypertension
Metabolic syndrome
Cardiovascular disease
Associated factors

ABSTRACT

Background: Hypertension is an exceptionally common condition which every now and again remains undiscovered until generally late in its course, prompting an assortment of other hazardous conditions. Around 91.3% of the hypertensive patients had no less than one related cardiovascular hazard factor. Our investigation plans to estimate the relationship of hazard factor with cardiovascular Disease.
Materials and methods: This is observational and follows up investigation which focused 145 patients from Indira Gandhi Memorial Hospital over a time of one year (July 2016 to October 2017). Out of 145, 127 Patients could enrolled in the study for actual biochemical Estimation. We followed the modified NCEP ATP-III criteria of metabolic Syndrome for categorization of the patients.
Result: Among 127 patients, 90 (78.26%) patients were found to be having metabolic disorder and without metabolic disorder were 25 (21.73%) and frequency rate was high in the age assemble between 51 and 60. Prevalence rate was high in farmer housewives having 4–6 years length of hypertension. Most common combination of lifted levels of parameters found to be HbA1c, triglyceride and waist circumference and it was 33.33% in both male and female. Lipid profile and was abnormal during baseline, and significant variation was found during follow up after patient counseling and proper treatment.
Conclusion: The study justifies the view that all hypertensive patients should be screened for metabolic syndrome and those who diagnosed as a positive should be put on the proper treatment to protect them from CVS risk.

1. Introduction

Today, an enormous number of individuals in developing countries are confronting burden of Heart attacks. The Epidemiological investigations recommends, on a worldwide level, CVD represents 31% of all deaths [1]. The assessed cost of CVD will be $1044 billion by 2030 [2]. Increased pervasiveness of CVD risk factors, for example, hypertension, tobacco utilization, smoking, consumes lipid containing diet family history, diabetes, corpulence and lipids in India [3–6].

Patients living in tribal district with hypertension and a comorbid state of metabolic disorder have expanded quantities of cardiovascular sickness (CVD) scenes, and all-cause mortality [5]. At the point when surveyed deliberately, the commonness of cardiovascular disease is most likely most noteworthy among patients with metabolic disorder when contrasted and the typical [4,5]. With expanding recognition of the significance of metabolic disorder in the administration of CVD, cardiologist must get comfortable with metabolic disorder and build up a multidisciplinary approach, including early diagnosis and suitable administration [6]. The metabolic disorder alludes to the co-event of a few known cardiovascular hazard factors, including insulin resistance, obesity atherogenic dyslipidemia and hypertension [6,7]. These conditions are interrelated and share underlying mediators, mechanisms and pathways [8]. It has turned out to be progressively evident that specific CVD dangers tend to bunch, or happen together [9]. This grouping of some hazard factors and their mutual responsiveness to way of life changes recommends that they are not autonomous of each other and that they share basic causes, components and highlights [10].

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https://doi.org/10.1016/j.dsx.2018.12.015
1871-4021/

The NCEP ATP III definition is a standout amongst the most broadly utilized criteria of metabolic According to the NCEP ATP III definition, metabolic disorder is available if at least three of the accompanying five criteria are met waist circumference more than 40 inches (men) or 35 inches (ladies), pulse more than 130/85 mmHg, fasting triglyceride (TG) level more than 150 mg/dl, fasting high-density lipoprotein (HDL) cholesterol level under 40 mg/dl (men) or 50 mg/dl (ladies) and fasting glucose more than 100 mg/dl [11,12].

2. Materials and methods

The investigation was completed at OPD of Medicine Division determined to have hypertension, diabetes mellitus or beforehand therapeutic history of Diabetes mellitus incorporated into the examination to evaluate the Prevalence of metabolic disorder in hypertensive patients at Indira Gandhi Memorial (IGM) Hospital, Shirpur.

2.1. Study outline

The Follow up and observational examination was completed to explore the commonness of metabolic disorder in the hypertensive patients.

2.2. Study protocol

Step 1. All 145 hypertensive patients were enrolled. At the time of enrollment, their Name, Age, Sex, Address, Contacts no., Occupation, Education/Qualification, Economic status, Social history in Family history recorded,

For biochemical investigation, it was informed to them that they were called by telephonic communication on the day of camp for blood sugar, HbA1c and lipid profile.

Step 2. Among 145, about 127 Patients visited to hospital for biochemical investigation, Lipid profile, HbA1c was investigated

After analysis it was found that 90 patients were having metabolic syndrome according to modified NCEP ATP-III criteria.

Step 3. Patients were called to collect their reports;

Those hypertensive patients who were suffering from metabolic syndrome were counsel regarding diet, exercise, regular health check up, Yoga, cessation of risk factors and we put on the proper treatment under the guidance of Dr. Pitamber Dighore. (MD, DNB, IGM Hospital Shirpur).

They were called for follow up camp after six months.

Step 4. Follow up camp was conducted for biochemical investigation after counseling and treatment. Results were drawn and data was analyzed.

2.3. Site of study

The investigation was intended to undertake inside Indira Gandhi Memorial Hospital, Shirpur from August 2016 to February 2017.

2.4. Study setting

Study was done in OPD division; on the patients contained both the known and new instances of hypertension, Diabetes Mellitus those taking the prescription for hypertension, diabetes mellitus were chosen arbitrarily at IGM Hospital, Shirpur.

2.5. Source of data

All important and pertinent data are gathered from:

- OPD cards
- Treatment chart
- Laboratory information report and Patient history records
- Verbal correspondence with patients or their watchmen.

2.6. Patient data collection

A different information section organize (Proforma) for consolidating patient's subtle elements was outlined and arranged so as to gather all the basic data which included the points of interest of patient and additionally drug.

2.7. Proforma I:

It incorporates points of interest of Patient's, for example, Name, Age, Sex, Address, Contacts no., Occupation, Education/Qualification, Social history in which smoking status included current Smokers and Non-smokers; Family history, date of discussion to doctor and Name of doctor.

2.8. Proforma II:

It incorporates Anthropometric for example; Blood weight, Weight, Height, Waist circumference (WC) and Body mass file (BMI). Biochemical data incorporates Blood sugar and Lipid profile. Glucose tests incorporate Random, Fasting plasma glucose level (FBS) and Post-prandial plasma glucose level (PPBS); a lipid profile test incorporates Total cholesterol (TC), Triglycerides (TG), High thickness lipoprotein (HDL) and High thickness lipoprotein (LDL). incorporates into this Proforma.

2.9. Proforma III:

It incorporates different tests if any done instead of lipid profile and glucose level; conclusion, related ailments and past medicinal history.

2.10. Proforma IV:

It incorporates points of interest of medicine which were endorsed to patients by the doctor.

2.11. Inclusion criteria:

- Patient with age more than 18.
- Patient willing to take part in the investigation.
- Patient with hypertension.

2.12. Exclusion criteria:

- Patient with hypothyroidism.
- Patient with optional hypertension.
- Patients who are not willing to give required answers
- Patient with, renal malady, hepatic infection and so forth
- Pregnant and Lactating ladies

2.13. Strategy for information collection

2.13.1. Clinical information estimations

- Blood weight (BP) was estimated during center visits after patients had stayed in a sitting position for no less than 10 min. BP was estimated twice to the closest two mmHg from the left arm of the member utilizing a standard sphygmomanometer. The normal of the two estimations was utilized for all investigation.
- Body weight of the subjects wearing light apparel without shoes was estimated with 0.1 kg accuracy.
- Height was estimated to the closest 0.5 cm.
- Waist circumference (WC) was estimated with the estimating tape situated halfway between the most reduced rib and the iliac peak after the patient had breathed out typically.

2.14. Biochemical investigation

- After 12–14 h of an overnight fasting, the example of fasting blood glucose (FBS), and following 2 h of dinner post prandial blood glucose test (PPBS) were gathered from each subject.
- Total cholesterol (TC), triglycerides (TG), high thickness lipoprotein (HDL-C) and low thickness lipoprotein (LDL-C) diagnosed by Automatic Analyzer.

2.15. Diagnostic criteria

The determination of metabolic disorder has done by National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III).

The National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III), 2001:

As indicated by NCEP'S ATP III criteria patients ought to have at least three of the accompanying five hazard factors for the nearness of metabolic disorder:

- Obesity-Waist periphery $\geq$102 cm in men, $\geq$88 cm in ladies
- Triglycerides-$\geq$150 mg/dl or treated for dyslipidaemia.
- HDL cholesterol-<40 mg/dl in men, <50 mg/dl in ladies for or pharmaceutical for decreased levels.
- Blood weight $\geq$130/85 mmhg or pharmaceutical for hypertension.
- Fasting plasma glucose-$\geq$110 mg/dl or T2DM (Type 2 diabetes mellitus).

2.16. Ethical clearance

The investigation was affirmed by Institutional Human Ethical Committee (IHEC) of R. C. Patel Institute of Pharmaceutical Education and Research, Shirpur.

2.17. Informed consent

Informed consent is an essential for all exploration to features the reason and extent of the investigation, the advantages, how the outcomes will be helpful. All members were required to give their educated assent intentionally in also Local language.

3. Result

In present study, total 5000 patients visited to Out Patient Dept of medication division during the examination time frame at Indira Gandhi Memorial Hospital, Shirpur. Around 127 hypertensive patients were incorporated for the biochemical examination. Out of 127, 90 patients were diagnosed with the metabolic disorder.

3.1. Sex

Patients were classified on the basis of the sex (male and Female). Out of 90 patients, 60 patients were female and 30 patients were male.

3.2. Age

Development of insulin resistance, other hormonal changes increased instinctive adiposity which are all vital in the pathogenesis of metabolic disorder. Age of the patients were recorded, it was discovered that more commonness was found in the age aggregate between 51 and 60 took after by 61–70 in male patients, and more predominance was found in the age gather between 51 and 60 took after by 61–70 General outcome demonstrated that more rate of predominance was in the age between 51 and 60. Fig. 1: A.

3.3. Waist circumference

Waist Circumference is an intermediary measure of abdominal obesity e waist circumference is well corresponding with instinctive fat tissue and is a superior anthropometric indicator of metabolic hazard factors than BMI. It has been watched that more pervasiveness rate of metabolic disorder is in the female patients having abdomen circuit in the range 91–100. While more pervasiveness was found in male patients in the range 101–110 level. Fig. 2: D.

3.4. Diet

More fat in the diet is additionally expands the possibility of creating dyslipidemia in the patients. It was discovered that 21 (70%) of mixed diet and 9 (30%) of vegetarian lower diet were among male patients. While, 25 (42%) of were mixed diet 35 (58%) of vegetarian diet were in female patients.

3.5. Occupation

The occupation held longest period life was recorded and used to make occupation based financial status. It has found, out of 60 female patients, 26 (43.33%) patients were housewives followed by 14 (23.33%) were Shopkeeper and staying 10 (16.66%) workers and 16.16% were teachers. If there should arise an occurrence of male patients, 10 (33.33%) were worker, 8 (26.33%) were business person likewise 7 (23.33%) and 5 (16.16%) male patients were teacher and farmer individually. Fig. 1: B.

3.6. Duration of HT

A record of patients as indicated by duration of hypertension decides hazard factor for the present illness and other related diseases, long term of uncontrolled hypertension builds the movement of complexities and furthermore empower the doctor for polypharmacy which increases the cost and patient disobedience to the treatment. In present study, 8 (26.66%) in male and 25 (33.3%) patients in female were having 4–6 years duration of Hypertension. And About 2 (6.66%)in Male and 1 (1.66%) patients having 12–14 years length of hypertension in male and female patients. General more pervasiveness of metabolic disorder is in the duration of hypertension between 4 and 6 years in the both genders. In present study it was also found that as the duration of hypertension

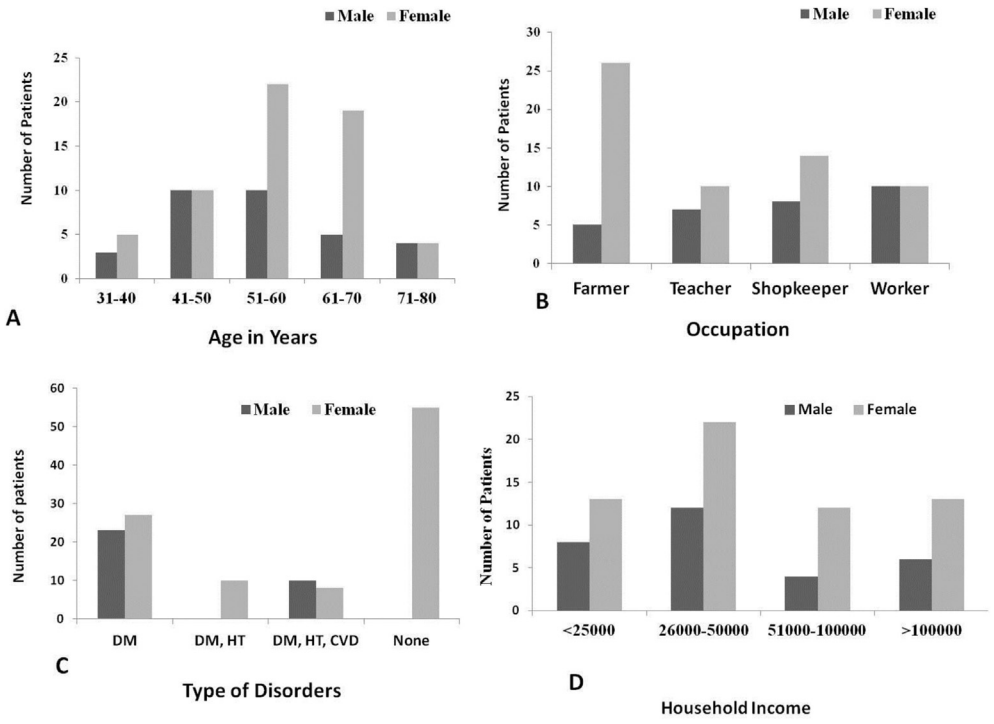

Fig. 1. Factors affecting Health of the Hypertensive patients,
A: Age in years, B: Occupation, C: Family History, D: Household Income.

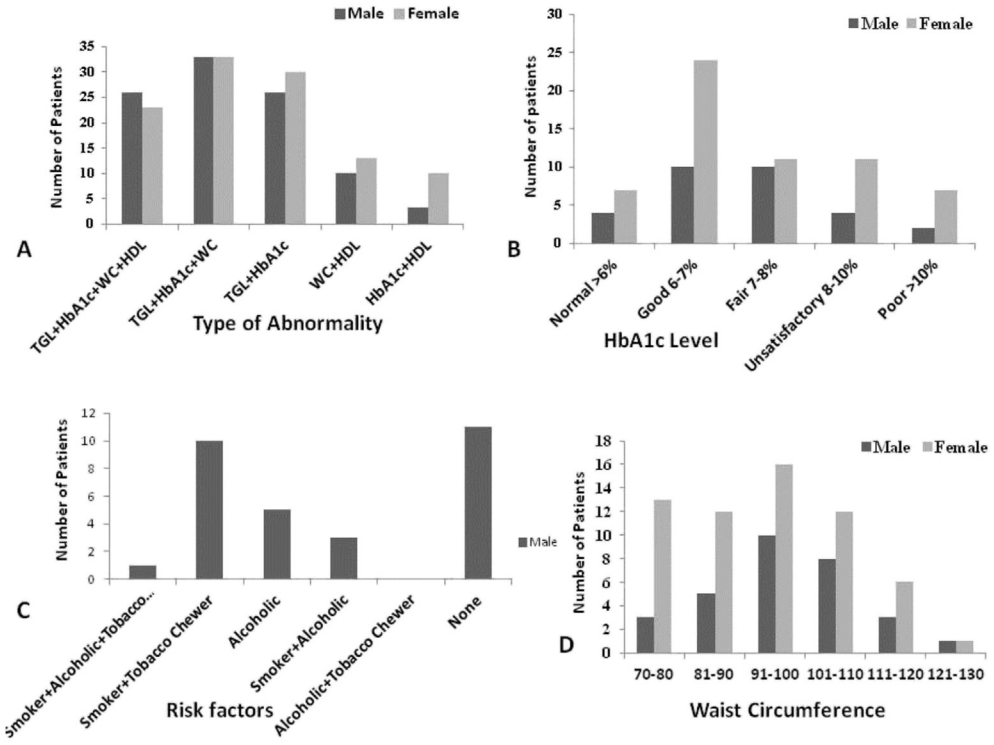

Fig. 2. Factors affecting Health of the Hypertensive patients
A: Type of Abnormality, B: HbA1c level, C: Risk Factors, D: Waist Circumference.

increases the risk of having metabolic syndrome increases, but as the physician put them on treatment they found the significant variation in their results.

3.7. Risk factors

In our India in the event of Male smoking, Alcohol, and Tobacco Chewing related with increase predominance of metabolic

disorder. We asses these elements in different combinations and watched that essentially higher pervasiveness was found in the smoking and tobacco chewer combined group and low commonness rate was in the smoking and tobacco with alcohol consumption. On the basis of this result, it indicates that alcohol might be protective for the cardiovascular disease. Fig. 2: C.

3.8. Financial status

Patients having low family income are more inclined to the metabolic disorder because of lack of healthy diet and irregular examination and resistance to treatment. Family annual income was distributed in four classifications as per the patient's family pay for the earlier year that is 25000 or less, 26000–50000, 51000–100000, and in excess of 100000 Rs. It has been discovered that commonness of metabolic disorder was fundamentally increased 24.44% and 40% in low house hold pay assemble in male and female patient that is in the range between 50000 rupees for each annum. Fig. 1: D.

3.9. Family history

Family history is one parameter incorporated in the study because there are some genetic substances included which are perisoxome proliferators, adiponectin CD3C, B-adrenergic receptor, Insulin receptor substrate, B-hydroxylated dehydrogenase, and adipocytokines. Add up to patients with positive family history were 33% and 55% in male and female patient. Patients having positive family history with DM are 7 (23%) and 16 (27%) and with family history of DM, CVD, HT are 3 (10%) and 5 (8%) in male and female. Patients with family history of DM and HT are 6 (10%) are just the female patient. Patients which are not having positive family history are 20% and 33%. Fig. 1: C.

3.10. HbA1c ranges

There is a connection amongst HbA1c and CVD. Glycated hemoglobin (HbA1c) is an utilized marker for long haul glycaemic control. This examination is an endeavor to assess the symptomatic estimation of HbA1c in anticipating diabetic dyslipidemia After dissemination of the patients as indicated by HbA1c ranges, it has been discovered that the vast majority of the patients were in great control 10 (33.3%) and 24 (40%) in male and female. In any case, more commonness 10 (33.33%) and 11 (18.33%) of metabolic disorder is additionally in the HbA1c ranges 7–8 and 4 (13.33%) and 7 (1.66%) patients were underneath extend 6 and 2 (6.66%) and 7 (11.66%) patients were in poor control. Fig. 2: B.

3.11. Type of Abnormality

The most common combination was observed to be raised levels of TGL, HbA1c and waist circumference in both male and female patients took after by TGL and HbA1c (30%) in female and (26.66%) in male. The low prevalence rate was in the combination of HDL, HbA1c (10%) in male and WC, HDL (13.33%) in female. Fig. 2: A.

3.12. Lipid profile and HbA1c

The baseline and follow up data of lipid profile of the hypertensive patients reveals the significant variations in the values due to proper treatment and counseling after screening for metabolic syndrome.

Male hypertensive patients having higher levels of cholesterol 166.2 ± 3.180 which is compared with result at the end of the study 120.0 ± 5.880 hence the significant variation was found to be 46.2 ± 2.7, and p value is < 0.0001 which is significant in both male and female. As we look for triglyceride results we got highly significant values in male and female 220.6 ± 1.014 and 208.5 ± 2.014 both that is $p < 0.0009$ and significant variation was found to be 12.1 ± 1.00 and high level of HbA1c 9.035 ± 0.3285 at baseline and 7.495 ± 0.2614 at the end of the study hence the significant variation was found to be 1.540 ± 0.0671 respectively which was less significant (P value- 0.0002). Higher levels of LDL at baseline 148.6 ± 2.108 in both male and female patients compared with result at the end of the study 143.5 ± 2.007 with significant variation was found to be 5.10 ± 0.101 and p value was significant. Results of HDL was found to be significant in both male and female (37.23 ± 10.68 and 46.19 ± 6.685) with $p < 0.0001$ and significant variation was 8.96 ± 3.995. Table 1.

4. Discussion

Hypertension is related with laboratory and anthropometric findings of metabolic disorder [12]. In present study, the estimation was done by modified NCEP ATP III rules. Previous studies reported that, the pervasiveness of metabolic abnormalities related with blood vessel hypertension in people in the control and hypertensive went from 0.8 to 35.3%, individually. Around 91.3% of the hypertensive patients had no less than one related cardiovascular hazard factor [13]. A disorder is basically a grouping of variables that happen together more regularly than by risk alone and for which the reason is frequently indeterminate. In any case, patients with the metabolic disorder are at double the risk of producing CVD throughout the following 5–10 years as people without the disorder [14]. The most generally perceived of the metabolic hazard factors are atherogenic dyslipidemia, hypertension, and elevated HbA1c [15,16]. Total 5000 patients were visited to OPD of medication division of doctor's facility during the examination time frames among them 127 were incorporated for the study [16–19]. Most of the of patients in the present investigation uncovered that it has been watched that predominance of metabolic disorder is twofold 60 (67%) in males than in females 30 (33%) Prevalence of metabolic disorder increased with age and lower with young age [21–24]. Appropriation demonstrates the outcome that female patients are more predominant in the age between 51 and 60 year took after by 61–70 year, and male patients are more pervasive in the age between 41 and 50 year took after by 51–60 year. General pervasiveness rate is more in the age between 51 and 60. There is bringing down pervasiveness rate in the age between 31 and 40. In the examination, it has been watched that predominance rate is same in the age between 20-40 and 41–60 and lower in the age more than 60. The risk of CVD hazard related with rising age can be diminished incompletely by the adjustment of coinciding CVD risk elements. When conveying a person's CVD hazard paying little heed to age, both here and now (10-year) and long term (>10 years) dangers (both total and relative dangers) ought to be talked about and the ensuing administration of CVD chance variables ought to be individualized [20]. BMI and Waist circumference ought to be estimated and observed for CVD hazard appraisal particularly in high hazard. WC demonstrates the abdominal fat, which is more

Table 1
The baseline and follow up data of lipid profile.

Lipid Profile	Baseline	Follow Up
Cholesterol	166.2 ± 3.180	120.0 ± 5.880
Triglyceride	220.6 ± 1.014	208.5 ± 2.014
LDL	148.6 ± 2.108	143.5 ± 2.007
HDL	37.23 ± 10.68	46.19 ± 6.685
HbA1c	9.035 ± 0.3285	7.495 ± 0.2614

associated with metabolic hazard factors than raised BMI [25]. A few patients can build up the different metabolic hazard factors when waist circumference is insignificantly expanded; WC has strong critical relationship with lipid profile [16]. Family history is significant hazard elements of Type 2 DM. About 33% and 45% had positive family history in male and female patients [26]. It has observed that 23% and 27% are certain with family history of diabetes while 10% and 8% are sure with DM and CVD. There was 95% positive family history for any of these diseases. Family History serve in as a bridges from hereditary qualities to genomics in clinical practice since they mirror the nearness of single-quality issue, as well as of shared qualities that might be in charge of polygenic (complex) disorders, environment, and quality condition cooperation's that may impact risk. Because family history is an autonomous hazard factor for CVD, it can possibly turn into a screening instrument to distinguish individuals, particularly asymptomatic youthful grown-ups, who are at expanded CVD risk. Family history is real hazard factor of metabolic disorder. High level of LDL, low HDL and non vegetarian diet are advancement of CVS sickness [27–29].

Smoker and Tobacco chewer have higher (33.33%) pervasiveness than heavy drinkers (16.16%). While same outcomes in the investigation. Low FPG, low HbA1c, and low insulin protection are related with alcohol drinking. is lessening CVD risk in moderately aged and old aged persons and it a defensive impact against low HDL-C Cigarette smoking makes the adherence of flowing monocytes endothelial cells. The adherence of coursing monocytes to the endothelium, relocation into sub endothelium consequent arrangement of froth cells are rule beginning occasions in the advancement of atherosclerosis. Smoker has brought down anthropometric lists than non smoker [30,34]. Most common combination was found to be abnormal levels of waist circumference, triglycerides, and sugar in both groups male and female. 26.60% and 23.33% patients have all five metabolic criteria abnormalities. Lower pervasiveness rate was in the mix of HbA1c and HDL. While in past investigations, by they found the most well-known mix was low HDL and Obesity. HDL restricts atherosclerosis straight forwardly by expelling cholesterol from froth cells. Low HDL is basic in insulin protection states, for example, MS and type 2 DM and may represent generous bit of overabundance CVS illness watched patients with these conditions. (Level of TGL is higher in females than in boys while in ponder conveyed by TGL was higher in boys). High TGL is more huge coronary supply route infection risk factor in females than in men. Hypertriglyceridemia has the most astounding prescient capacity. TGL is principle type of fat in body and eating regimen. They give vitality, protect the body, shield inside organs from stun give vitality hold and help the body to utilize sugar and protein efficiently [35].

HbA1c reflects normal blood glucose levels more than a while and its estimations do not require fasting blood test. There was great understanding between A1c and FPF in recognizing people with metabolic disorder. It is unquestionably presume that utilizing HbA1c rather than FPG to characterize metabolic disorder is doable. The HbA1c distinguishes a marginally littler gathering of individuals having metabolic disorder anyway it likewise recognizes subjects at high hazard for cardiovascular ailment even in those without diabetes. It has critical relationship with BMI, FPG, BP, LDL TGL, serum cholesterol. HbA1c, more than 5.6 had most extreme precision to decide metabolic disorder [24,31–33]. Overall, HbA1c levels higher than 6.0% were significantly associated with higher pooled HR estimates for cardiovascular mortality [36].

5. Conclusion

The examination was done effectively to discover the pervasiveness of metabolic disorder in hypertensive patients and hazardous elements responsible for causing CVS risk in a Indira Gandhi Memorial Hospital at Shirpur. The predominance of metabolic disorder was observed to be 33% and 67% in female and males are more common than female in tribal region. Most normal combination was observed to be raised HbA1c, TGL and Waist Circumference. It has been discovered that there is strong relationship amongst HbA1c and lipid profile in hypertensive patients. The predominance of lipid abnormalities in the patients with hypertension is high and most of the patients were not on the treatment. Raised TGL, HbA1c and waist circumference are the predominant lipid variations from the norm in patients with hypertension.

It was observed that cigarette smoking and tobacco chewing is reason for metabolic disorder, there ought to be important to create awareness by appropriate counseling to patients with respect to the smoking discontinuance programs. Patients after age 40 year should take care of their health and regular check up of sugar, HbA1c and lipid profile, since maturing causes metabolic disorder. Overweight and obese patients are more inclined to cause metabolic disorder, so every one of these peoples should take care of their health. Exercise should be done regularly, physical action like running, cycling and so forth. Consequently significance of screening for metabolic disorder of every single hypertensive patient in tribal area is needed.

Conflicts of interest

The authors had no conflict of interest to disclose.

Acknowledgment

Authors are thankful to Principal, R. C. Patel Institute of Pharmaceutical Education and Research, Shirpur and Indira Gandhi memorial Hospital, shirpur.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dsx.2018.12.015.

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