Risk of Hypertension During Development in Information Technology:
An Explanatory Essay on Understanding of Increasing Hypertension With Growing Time

Shagufta Naz
Lahore College for Women University, Pakistan

Wajeeha Salamat
Lahore College for Women University, Pakistan

Saima Sharif
Lahore College for Women University, Pakistan

INTRODUCTION

Internet based technology has a great attraction in people lives. Now the people solve majority of their issues in no time. They can transfer money, purchase grocery or order any medicine by using information technology. The lives of people are no longer so tough regarding the facilities. But unfortunately, people cannot purchase health. In this modern era, people have to take care of their blood pressure level. The force which is exerted by blood against the wall of blood arteries is called blood pressure. (Yatabe et al., 2020). The blood arteries are major blood vessel in body. Hypertension (HTN) is the disease that occurs when blood pressure is too high in the body. (Stassen et al., 2018). In the light of national high blood pressure education program, hypertension measurement will be from two or more readings of systolic or diastolic blood pressure as taken by sphygmomanometer. The reading is measured above 95th percentile for gender, height and age on three different times of the day as hypertension cannot be measured by a single reading. High mortality due to hypertension is due to its silently killing of patients. (Nasarudin et al., 2016).

Hypertension is the world's largest cause of death. (Ravinder., 2015). There is a great need of telemedicine intervention (Hoffer et al 2021). Children are much fascinated in using information technology, no doubt it can take revolution in their mind level but their health condition should also be monitored. (Baracco et al., 2020;Gupta et al., 2018). Hypertension (HTN) is also known as "silent killer" as it remain undiagnosed for a long time. People also give no attention to monitor it, when it is developing. Due to lack of symptoms it is estimated that there will be one quarter of people with hypertension in 2050. (Kearney et al., 2015). It affects nervous system, blood vessels and circulatory system. (Stassaen et al., 2018).

Hypertension has two types as primary and secondary hypertension. Primary or essential hypertension remains unknown in people and its risk is 95% in adults. In near future its rate will be alarming. The secondary hypertension is due to some cause that can be investigated like renal cause. It is more common in children as compared to adults. (Baracco et al., 2020;Gupta et al., 2018). Hypertension is not negligible in rural areas as their life style is also not ideal. The people living in rural areas also face

many tensions like stress of larger family size, sedentary lifestyle of females (housewives) in development of hypertension. (Fawwad et al, 2019).

Large numbers of factors are responsible for high prevalence as obesity, old age, insulin resistance, increased extracellular volume, diabetic nephropathy and increased arterial stiffness each of these levels can be raised in near future. (Geiss et al., 2002). Light significant factors that affect hypertension are person age, gender, family history and presence of diabetes. High significant factors are lifestyle including no time to take exercise, lifestyles, diabetes and dyslipidemia. (Basit et al., 2017). It is reported that progression of diabetic nephropathy largely depend on presence of hypertension but at the same time it is debated the presence of high blood pressure has pathogenic role in Type 1 nephropathy. (Abougalambouet al., 2013). About 20-80% of diabetic patient suffers from hypertension. Hence, diabetic becomes more susceptible to hypertension than the gender or age, hence accompanied by increased total sodium level in body. (Maahs et al., 2005). In insulin dependent patient it is not present during diagnosis of diabetes but for non insulin dependent person, hypertension mostly diagnosed during diagnosis of diabetes. (Ohwovorioleet al., 2019).

Stress, particularly occupational stress has garnered growing attention among school teachers as a risk factor for hypertension (HTN). Administrative worries, professional progress, student motivation, job overload owing to high class sizes, extensive verbal communication, and extended standing are all stressful occupational tasks. (Ravinder., 2015). In 2000, there were only 1 billion people with hypertension but due to high prevalence it can be increased to 1.56 billion till 2050. The worldwide prevalence is 40.8% while control rate is 32.3%. In low income countries its prevalence is more than developed countries. (Lim et al., 2010).

Although there is large incidence of hypertension but unfortunately no data is reported in overall prevalence in developing countries (Mittal et al., 2010). The reason for lack of data is economic burden in undeveloped countries, their political and social issues. Other reason is that Asian people consume diet rich in salt, high fat consumption, avoidance of food and vegetables, which are major factors for hypertension. The magnitude of prevalence cannot be described in a single survey as large number of people is in hypertension but it is not diagnosed in them. (Shah et al., 2014). Hypertension do not directly depend on age or gender. For urban males, there is negative correlation between diabetes and hypertension, while positive for urban females, rural males and rural females. (Tuomilehto et al., 2001). As compared to other provinces of a country, the province which has more facilities by providing technology has highest prevalence which may be due to sedentary life style and more development (Radhika et al., 2007). Immigrant and traumatized people are at a greater risk for hypertension. (Kinzie et al., 2008).

With the passage of time people will have best things in their lives as compared to past but at the same time they have a lot of stress of losing these things as moving away from nature and purity of things. So, to cope with best things we have to resolve all the problems and tension that may lead to several other diseases like of hypertension. In order to make smooth flow of information technology, further trials are required regarding managing the data and fulfillment of proper rules for controlling information technology based hypertension. Factors associated with its control are not under consideration of people. Clinic and hospital staff should give proper management guidance to patients. The prevalence of poor hypertension control among diabetic patients is dangerous. The aim of present report is to demonstrate hypertension risk in both developed and undeveloped countries in the era of information technology. The main focus is also to attract attention of people and government for prevention of this risky disease hence, people can be prevented from its huge prevalence in future. By seeking attention its risk will be minimized all over the world as people will also give time to their health management system.

BACKGROUND

Bardisi et al. (2021) founded incidence of hypertension in patients of diabetic retinopathy (DR) and its risk factors. Screenings ascertained the frequency, severity and progression of hypertension. Diabetic retinopathy was shown to be prevalent in 15.2 percent of people. The prevalence of DR increased steadily over three successive screening periods, according to the results. The study's results revealed that there was no connection between diabetic retinopathy with smoking and obesity in diabetes. Age on the other hand was reported as important factors in diabetic retinopathy in hypertensives. Study showed 49.6% of hypertension in patients without diabetes while 50.4% of patients were free from hypertension and diabetes. Diabetic retinopathy (DR) a sole microvascular disorder of diabetes is an asymptomatic condition that develops slowly and gradually. In this findings, 30% of diabetics were hypertensive i.e every 3 in 10, indicating that diabetics are more vulnerable to hypertension.

Basit et al. (2020) determined prevalence of hypertension in different regions of Pakistan. It was part of national diabetic survey a massive community-based epidemiological study. It was measured in both diabetic and non-diabetic people in both urban and rural areas of Pakistan's four provinces. Individuals with self-reported history of hypertension or taking some antihypertensive medication as a therapy were considered known hypertensive with diabetes. For Khyber Pakhtunkhwa, hypertension was common in urban areas while in other provinces it was more common in rural areas. In accordance of finding, Pakistan's 46.2 percent prevalence of hypertension, along with its related risk factors, is concerning. As a result, lifestyle changes and public awareness education are urgently needed to manage or minimize hypertension prevalence, especially in diabetic patients who are more susceptible. Now the facilities of technology are provided both in urban and rural areas. People living either in urban and rural areas have a burden of hypertension. No doubt life has changed from simplicity in rural areas but there is still emigration (Table 2).

Fokou et al. (2020) found high rate of hypertension in people. A hospital predicated cross-sectional study was conducted for 6 months and 109 participants; aged 24–81 years were enrolled in utilizing simple arbitrary sampling. A systematic questionnaire was developed to gather socio demographic information, such as habitual demeanors, health records, blood pressure, and anthropometric measurements. A total of 109 people were participating in the survey, with 60.6 percent of them being women and 39.4 percent being men. The participants ranged in age from 24 to 81 years old, with a median age of 55years. Study founded some of factors as modified factors while other was non modified risk factors. Modified risk factors were body physic, alcohol consumption, feeding rate and lifestyle. While the nonmodified risk factors were age, gender and presence of other disease. About nine-tenths of the participants (88.1%) were over the age of 40. Hypertension was found to be prevalent in 86.2 percent. The analysis of hypertension in urban and rural areas showed that hypertension is high in urban than rural areas.

Table 1. Risk factors at different hypertension stages (Fokou et al, 2020)

Predictor variables	Hypertensive stage 1 (35)	Normotensive (15)	Single variable analysis		Analysis with multiple variable	
	N (%)	N (%)	95% CI	Statistical P value	5% CI	Statistical P value
Gender						
Male	16 (45.7%)	3 (20.0%)	1		0.058 (0.004-0.956)	0.046
Female	19 (54.3%)	12 (80.0%)	0.297 (0.071-1.240)	0.086	1	

Table 1. Continued

Predictor variables	Hypertensive stage 1 (35)	Normotensive (15)	Single variable analysis		Analysis with multiple variable	
	N (%)	N (%)	95% CI	Statistical P value	5% CI	Statistical P value
Feeding rate						
≥3 times a day	23 (65.7%)	7 (46.7%)	2.190 (0.639-7.504)	0.208	6.478 (1.035-40.533)	0.046
<3 times a day	12 (34.3%)	8 (53.3%)	1		1	
Duration of diabetes						
≥10 years	17 (48.6%)	4 (26.7%)	2.597 (0.692-9.747)	0.150	0.856 (0.739-0.992)	0.039
<10 years	18 (51.4%)	11 (73.3%)	1		1	
Smoking						
Yes	2 (5.7%)	3 (20.0%)	0.242 (0.036-1.633)	0.123	0.017 (0.000-0.769)	0.036
No	33 (94.3%)	12 (80.0%)	1		1	
Occupation						
Not retired or not a housewife	21 (60.0%)	5 (33.3%)	1		0.435 (0.080-2.361)	0.335
Retired or housewife	14 (40.0%)	10 (66.7%)	0.333 (0.094-1.185)	0.084	1	
Tribe						
Not from the west region	18 (51.4%)	8 (53.3%)	1.079 (0.321-3.626)	0.902	0.257 (0.039-1.699)	0.159
West region	17 (48.6%)	7 (46.7%)	1		1	
From stage 1 to stage 2 in hypertension	**Hypertensive stage 2 (59)**	**Hypertensive stage 1 (35)**	**Univariate analysis**		**Multivariate analysis**	
Age			OR (95% CI)	P value	OR (95% CI)	P Value
>40 years	56 (94.9%)	29 (82.9%)	3.862 (0.900-16.574)	0.055	0.916 (0.866-0.969)	0.002
≤40 years	3 (5.1%)	6 (17.1%)	1		1	
Duration of diabetes						
≥10 years	13 (22.0%)	17 (48.6%)	0.299 (0.121-0.739)	0.008	1.155 (1.051-1.270)	0.003
<10 years	46 (78.0%)	18 (52.4%)	1		1	
Waist circumference						
Abnormal	55 (93.2%)	27 (77.1%)	4.074 (1.126-14.735)	0.024	1.005 (0.965-1.047)	0.802
Normal	4 (6.8%)	8 (22.9%)	1		1	
Normotensives to hypertensive	**Hypertensive (94)**	**Normotensive (15)**	**Univariate analysis**		**Multivariate analysis**	
			OR (95% CI)	P value	OR (95% CI)	P Value
Waist-to-hip ratio						
Abnormal	83 (88.3%)	10 (66.7%)	3.773 (1.087-13.091)	0.028	0.000 (0.000-0.007)	0.003
Normal	11 (11.7%)	5 (33.3%)	1		1	
Smoking status						
Yes	5 (5.3%)	3 (20.0%)	0.225 (0.048-1.062)	0.043	0.175 (0.031-1.008)	0.051
No	89 (94.7%)	12 (80.0%)	1		1	
Feeding rate						
≥3 times a day	66 (70.2%)	7 (46.7%)	2.694 (0.891-8.146)	0.072	3.417 (1.019-11.455)	0.046
<3 times a Day	28 (29.8%)	8 (53.3%)	1		1	

Asiimwe et al. (2020) researched the prevalence and risk factors associated with type 2 diabetes, with and without hypertension on elderly patients aged 45-80 years attending Kanungu Health Centre IV, Kanungu District. From June to August 2019, a cross-sectional analysis was performed by Kanungu Health Centre IV patients aged 45 to 80. The prevalence of type 2 diabetes was determined by the patients' blood sugar levels. Questionnaires were also used to collect information on risk factors for type 2 diabetes in hypertensives. At P 0:05 samples were critically calculated. From the tested patients, the average prevalence of type 2 diabetes was 18.7%. Females made up 22.8 percent of diabetic patients without hypertension, while men made up 7.8 percent without hypertension.76.1 percent of diabetics have high blood pressure. Hypertension was absent in 18.4% of diabetics. It denotes hypertension and diabetes, all of which are extremely dangerous. It was prevalent in people aged from 61 to 65. In hypertensives, alcoholism, obesity, body mass index (BMI) and family history were shown to be substantially correlated with type 2 diabetes at P values less than 0.05. In study, high rate of diabetes mellitus was founded. Study concluded that hypertension is more prevalent in females of 61-65 years with type 2 diabetes mellitus. The study can be concluded by reported that in near future the rate of hypertension can be alarming.

Ohwovoriole et al. (2019) determined incidence of hypertension of Benin City. It was carried out in university of Benin teaching hospital and central hospital. Using sphygmomanometer 450 diabetic patients that have hypertension were selected and their blood pressure was measured by this apparatus (Sphygmomanometer). Other information gathered included age, gender, type of diabetes, weight, height, BMI and waist hip ratio. Hypertension was seen in 244 of the 450 participants, resulting in a prevalence rate of 54.2 percent. It was observed in 124 males (50.8%) and 120 females (49.2%), but the discrepancy was not substantial. 13 sample were with type 1 hypertension, while 231 subject group had type 2 hypertension. In the 2009 study, the incidence of diabetes rose by two-fold (from 7.2 percent to 14.2 percent), and the prevalence of reduced fasting glucose increased dramatically in both people with and without hypertension (6.5%).

Shah et al. (2018) reported that prevalence of hypertension should never be ignored; as it is a major global health problem for both developing and undeveloping countries. They searched published literatures in order to report rate of hypertension from 1990-2017. The person having blood pressure greater than 140/90mmHg were considered hypertensive. They studied 1240 articles from Pub Med, Scopus and Google. The overall prevalence of hypertension was 26.34%. The difference in prevalence value was also founded in urban and rural areas. The hypertension was high in urban areas and males. The first android mobile phone was invented in 2008 and studies showed different percentage for small, medium and large scale studies. The greater percentage was for large scale long term studies. Studies found rate of percentage increases with time. During 1990-1999 the rate of hypertension was 19.55% that was increased to 23.95% during 2000-2009. From 23.95% it was increased to 29.95% from 2009-2017. The prevalence of hypertension in international journal was reported of 27.44% while in local journal it was 23.32%.

Shafi and Shafi (2017) performed research on prevalence of hypertension in rural areas of Punjab, Pakistan. It was cross sectional study in which data is collected by health screening camp at different localities of Punjab. The standard questionnaires were used to collect data at health screening camp. Different parameters including low and high significant factors were analyzed. People having family history with hypertension were also recorded. The sample size was 13,722 patients. This study also observed greater portion of patient was unaware of hypertension. Only 62.3% patients were aware of hypertension while remaining percentage of unaware patients. Among aware patient of hypertension, 75.3% were on treatment for hypertension while remaining percentage was aware but untreated patients. About 32.3%

of individual have controlled blood pressure (table 1). In all patients being surveyed 9934 patients were free of hypertension, cardiovascular disease or kidney disease.

The median of the entire patient with hypertension was 40 years. In that study the 2138 or 15.5% people were diabetic along with hypertension, while 11578 or 84.4% were totally free from diabetes but hypertensive. Only 986 diabetic patients were aware of hypertension out of 2138. This data shows that people have little time to monitor their health situation. When people do exercise, time their activities set a plan, then a risk of much disease becomes decreased. In the era of information technology people do lot of work in a single sitting and do little physical activity. Now online shopping, safe money transfer and bill payment are done by a person sitting in home. People also have more burden of losing things what they already have.

Table 2. Prevalence of different modes of hypertension with different social factors (Shafi S.T and Shafi, 2017)

	All Patients Hypertension 13,722	Patient With Awareness 4812	Patient With Control (HTN) 3000	Patient with hypertension 1062
Physical Activity (Min/D)				
None	206 (1.5)	98 (47.5)	72 (73.4)	26 (26.5)
<30	888 (6.5)	440 (49.5)	300 (68.2)	106 (24.1)
30–60	2182 (15.9)	916 (41.9)	584 (26.7)	160 (17.5)
>60	10,412 (76)	3350 (32.2)	2040 (19.5)	7 68 (22.9)
Smoking				
Yes	2848 (20.7)	834 (29.2)	470 (56.3)	170 (20.3)
No	10,868 (79.2)	3972 (36.5)	2524 (63.5)	890 (22.4)
Alcohol				
Present	308 (2.2)	80 (26)	46 (57.5)	22 (27.5)
Absent	13,414 (97.7)	4728 (35.2)	2950 (62.3)	1038(21.9)
Body Mass Index (BMI)				
Less than 18.5	814 (6)	192 (23.5)	110 (57.2)	78 (40.6)
18.5–24.9	5100 (37.1)	1288 (25.2)	788 (61.1)	324 (25.1)
25–29.	94500 (34.1)	1700 (37.9)	1022 (60.1)	352 (20.7)
Greater than30	2794 (20.3)	1426 (51)	928 (65)	248 (17.3)
Diabetes Mellitus				
Yes	2138 (15.5)	1282 (60)	986 (76.9)	308 (24)
No	11,578 (84.4)	3530 (30.4)	2014 (57.1)	754 (21.3)
Cardiovascular Disease				
Yes	544 (4)	394 (72.4)	370 (94)	134 (34)
No	13,172 (96)	4418 (34)	2700 (61.1)	928 (21)

Bakshi et al. (2017) reported that hypertension is common among patients. Hypertension is major cause of many other disease and responsible for mortality in patients. On the determinants of inadequate hypertension regulation in these patients, there is little evidence. They wanted to know how common low hypertension management was in these patients and what causes contribution in it. From August 1, 2015 to December 31, 2015, patients at clinic of Buganda medical center having hypertension with diabetes were examined. Person having blood pressure of greater than 130mmHg of systolic blood pressure and 80mmHg of diastolic blood pressure were regarded as uncontrolled hypertensives.

Patients' data was collected by using questionnaire. For continuous variable summarization, the median and interquartile ranges (IQR) used. For categorical variables, frequency and percentage were employed. For predicting untreated hypertension, researchers used logistic regression. The bulk of the participants in the sample were females with 57 years of average age. The accumulation of non-prescription and ambiguous medications was also examined in that research. Hypertension was found to be prevalent in 206/295 people (69.8 percent). Uncontrolled hypertension was seen in 174/206 (84.5%) of the patients. Poor blood pressure management was related to non-adherence to antihypertensives, the occurrence of some long-term complications, and being too corpulent.

Dhoble et al. (2017) reported hypertension as a silent killer and a major problem of world. Non-communicable disorders such as asthma, diabetes and others are affecting young adults as a result of increasing globalization (18 to 40 years). It was a cross-sectional survey involving 370 people aged 18 to 40 who attended the outpatient department of an urban health training center. Data was gathered using a questionnaire and traditional anthropometric measurements. In the sitting posture, blood pressure was assessed with a sphygmomanometer. The modified odds ratio was calculated using stepwise logistic regression analysis. 23.24% of prevalence of hypertension was reported in this study. When compared to females, males had a greater frequency (25%) than females (22.3 percent). As compared to the normotensive sample group, the hypertensive had slightly higher BMI and waist hip ratio. People aged between 18 and 40 were more observed with hypertension. Hypertension was shown to be correlated with people who had high body mass index and waist to hip ratio between the age of 30 and 40.

Meo et al. (2017) stated that most challenging health issue of 21st century is hypertension. They conducted research in determining incidence with relationship to GDP and energy intake in Arab countries. Lowest prevalence of hypertension was in Muritania and Somalia (4.7%). Gulf cooperation council has highest incidence of 25.45 percent, while lowest prevalence in Non Gulf Cooperation Council of 12.69%. In both nations overall mean prevalence of type 2 diabetes mellitus was 16.17 percent. T2DM prevalence was shown to be strongly linked to obesity, hypertension and domestic product. In Arab countries the rate of hypertension was highest like Saudi Arabia, Oman, Kuwait and United Arab Emirates (above of 25%) (Figure1).

Çetinkaya et al. (2017) found different rate of hypertension (HT) in different cities of Turkey. Their main goal was to found the risk factors that are actually responsible for difference in rate of hypertension at different cities of urban and rural areas. In both urban and rural environments, stepwise quantification of risk factors of hypertension was performed by logistic regression analysis. The rate of hypertension found to higher in urban areas (28.4% as compared to 23.9%) with major contributing risk factor of urbanization. In both urban and rural areas, regression analysis found that different disease like obesity, diabetes and hyperlipidemia were positively related with hypertension while lifestyle dietary habits and physical activity was major factor in urban areas. Their results suggest that contributory factors differ between urban and rural environments, as well as between genders within each setting (Figure 2 and 3). By considering hypertension prevalence greater in urban areas, it can help researcher for greater findings and treatment investigation. Hence more focus to this issue is required.

Ali et al. (2016) conducted research for incidence of hypertension including its risk factors in type 2 diabetics. Type 2 diabetes and hypertension are two of the most common chronic conditions that significantly affect health conditions. From July 1st to December 31st, 2015, a study was performed in Karachi postgraduate Medical center. 264 type 2 diabetic patients, ranging in age from 18 to 80 years, were chosen using a non-purposive easy sampling methodology. The average age of all patients was 53.039.9 years, with a mean diabetes period of 10.076.04 years. A total of 187 patients (72.5 percent) were found to be hypertensive. Hypertension was more common in patients with a shorter history with diabetes (75.7%), extravagant corpulence (72.6%) and core inordinate corpulence (77.42%). Dyslipidemias and the presence of central extravagant corpulence were the major factor of hypertension. Diabetics have high incidence of hypertension. Hypertension was shown at the level of diastolic disorder did not vary substantially between the two classes. There was no substantial variation in BNP levels for RHTN patients with and without DM. Patients with RHTN and diabetes mellitus have more severe diastolic function deficiency than patients without o be linked to dyslipidemias and central inordinate corpulence in diabetic patients.

Wanvoegbe et al. (2015) found incidence of hypertension in diabetics as diabetes increases the risk of uncontrolled hypertension. It was descriptive and analytical cross-sectional analysis. The research took place over six-month duration (1 march 2014-30 August 2014). Patients were agreed to study and also visually diagnosed with the disease at the time of consultation. Sample consist of 400 people. There were 34% males and 38% females. The age of patient was around 55.6. Hypertension was shown to be prevalent in 70% of type 2 diabetic patients. Increasing age of above 55, abdominal inordinate corpulence and period of more than 10 years with diabetes (p = 0.009) were the risk factors substantially correlated with high blood pressure. Stroke and diabetic foot (p = 0.044) were two complications associated with high blood pressure. It was concluded that high blood pressure (HBP) is common in type 2 diabetes.

Aziz (2015) reported that the prevalence of essential hypertension is alarmingly increasing in modern population, in spite of the demographics, BMI and pabulum being of lower. By analyzing demographic studies performed in Pakistan, the potential factors responsible for this increase was listed in this study. In puberty, the prevalence rate is around three percent to four percent but it rises dramatically as people become older. Many environmental factors including extravagant corpulence, sedentary lifestyle mostly at adult age, cultural patterns, urbanization and gender together with genetic variability commonly affect modern nation.

Kingue et al. (2015) determined that research on prevalence of hypertension is important to take effective measures and forming control policies in future. World Health Organization phase wise approach to surveillance was used to conduct a prospective research in Cameroon's ten regions in finding incidence of hypertension in Cameroonian adults. Readings of blood pressure and glycemia were also evidenced by socio demographic factors. Both boys and girls with age group of 16 were involved in this research. A total of 15,470 people took part in the survey. Incidence of hypertension was 29.7% in population as age was also taken into account. The rate of diligence was 14.1 percent. Higher age, male sex, exorbitant corpulence, hyperglycemia and life in the Savannah region were all independent correlates of hypertension. The rate of hypertension is high in Cameroon's metropolitan regions and there is a lack of caution. The improvement and vulgarization of population opportunistic screening and inculcation should be emphasized in prevention and control strategies. Perhaps a stricter approach to current guidelines and a much more eager pursuit of the targeted treatment targets could decrease death level.

Abougalambou (2013) researched on prevalence of hypertension and found hypertension a very common risk factor in diabetics. Study showed that diabetics were 80-90% more risky for hypertension with risk rate of 20% in hypertension for diabetes. Main objective of this research was to determine risk factors in hypertensives that together affecting the diabetics. In both sexes (males and females), the

incidence rises with increasing. In that study, the average prevalence of hypertension in Type 1 diabetic patients was 14.7 percent (p 0.00001). 1077 type 2 diabetic patients at University of Sains Malaysiana, edifying hospital (Kelantan) who visited clinic were included in this study. Almost all of these patients were prospectively monitored for the whole year of 2008, from January to December. Logistic regression model was used for finding effect of variable on hypertension. 92.7% of population was found with hypertension. Around half of diabetes patients (52.8 percent) had hypertension that was not monitored to the prescribed blood pressure thresholds. Hypertension is influenced by age, BMI, HbA1c and level of education.

Açikgoz et al. (2013) reported on masked hypertension in which person's blood pressure in clinic is normal but a rise in hypertension at home. Patients with other disease like obesity, diabetes and other cardiovascular disease were higher in consistence with masked hypertension (MHT). Masked hypertension is common in patients as compared with general hypertension and increases cardiovascular complications. The more researches needed to know how frequent is masked hypertension and what causes masked hypertension in patients. They were also interested in seeing whether there was a connection between masked hypertension, cardiovascular problem and diabetes. Masked hypertension is characterized with clinical blood pressure of less than of home blood pressure in patients.

Diabetic patients with average age of 53 years having clinical blood pressure were included in this study. Antihypertensive drugs were not used by any of these patients. Both participants underwent a 24-hour ambulatory blood pressure monitorization (ABPM). The demographic profiles of the two populations did not vary statistically significantly. 80 diabetics with masked hypertension were diagnosed based on existing guidelines, with 63 percent having masked hypertension. When compared to normotensive diabetics, level of HBAlc is high in masked hypertensives. Even if the gap was not statistically significant, the high HbA1c group had higher night and mean systolic blood pressures. It was discovered that in individuals with poor blood glucose control, the prevalence of veiled hypertension increases.

Gupta et al. (2014) described that India is largely affected with hypertension and results in 1.1 million deaths per year (uncertainty index 0.9-1.3 million). It is projected to be responsible for 10.8% of all deaths in the country and 4.6% in disability adjusted life year. This study was performed in 2014, showing huge deaths of people. Now in current time of information technology the rate of hypertension is more devastating. About 9.8% of deaths are due to hypertension; that make it a global risk factor for death. Hence, entire world is suffering from this non communicable disease.

Priya et al. (2013) founded consistence of diabetes prevalence with hypertension and reported 4% of diabetes at 2013 but also suggested that it can be increased to 5.4%. The prevalence was 2.3% in urban areas while lower in rural areas in the early 1970s. The disease's prevalence has risen from 2.3 to 11.6% in urban area while in rural areas it increases to 1.4%. By 2025, it is estimated that the prevalence will have increased to 17.4 percent. Purpose of study was to find out how common hypertension is among diabetic patients treated at Nagpur's Govt. Medical College and Hospital. At that time, 952 patients visited the Diabetes center. With the help of a predesigned and pretested proforma with all of the patients' detailed medical histories, including the length of their diabetes, mode of diagnosis and personal preferences, were recorded. Information about diabetes in the family was gathered. A total of 510 (55%) of the 927 research participants had one or more complications. In this sample 396 (42.7%) of the participants were hypertensives. Twenty five research participants of diabetes were with 25 years and 22 (100%) of the participants were hypertensive with diabetes.

Mubarak et al. (2008) performed research in determining rate of hypertension in patients. The purpose of this research was to determine rate of hypertension including between diabetic and non diabetic persons with its risk factors. During the months of June to December 2006, a study of cross sectional type

were performed on 1000 type 2 diabetic patients that visited National center for diabetes, endocrine and genetic disease. The independent influence of variables on hypertension was assessed by using logistic regression analysis. Hypertension was found to be prevalent in 72.4 percent of the population (blood pressure >130/80 or on prescription for elevated blood pressure) (70.9 percent of males and 73.9 percent of females). According to the logistic regression, hypertension was positively related with age (P=.001), BMI (P=.001) and diabetes period (P=.001). One fifth of patients were aware of having hypertension but were unable to keep their blood pressure under control. This research was performed in 2008, now in modern time the risk factors has largely increased because hypertension is inherited from one aspect and from other aspect, people lifestyles, family issues, problems and security problems.

FOCUS OF THE ARTICLE

- To emphasize role and need of telemedicine intervention.
- People are taking large stress in moving ahead in life but don't take care of their health so this issue is presented.
- To take attention of people who ignored risky diseases until it affects many other organs.
- There is a great environment of criminalizing other person's data so people take stress all the time and increase the need to give more trials to information technology.
- To seek people's attention regarding negative impact of information on health.
- In making proper control of technology development in monitoring body BP level.
- People demands ease from modern life and don't take care of their health in hustle and bustle of life so proper management is presented.
- Large number of problems can be solved in less time by information technology so importance of heath maintenance should never be ignored.
- Researches on negative impact of advancement of information technology regarding health are very low so this chapter will truly attract people attention towards a silent killer (Hypertension).

SOLUTIONS AND RECOMMENDATIONS

- The people who are at risk due to genetic run of disease should maintain proper lifestyle and should do some physical activity.
- The people who are not now with hypertension should also monitor their lifestyle pattern in order to prevent it in future.
- People should manage their daily routines as when they get burden of other lives in negative sense, its result in changes in their health too.
- As the risk of psychological issues will also be increased so people having psychological problem should move to psychiatrist.
- By using information technology there will be more unemployment for the people who cannot cope with great change by information technology. There must be a check and balance in advantages and disadvantages of information technology.
- In near future early surveillance and prompt treatment can help in decreasing its prevalence.
- Only a stringent adherence to subsisting guidelines and a vigorous attention to procurement of desired therapeutic goal can sanction mobility and mortality as well as costs decrementation.

- The use of technology cannot be avoided but people are becoming more addict of modern technology and not want to walk even for a single purpose that causes many problem.
- People having psychological problems should visit psychologist before the time move away.
- People having hypertension should take regular medication in order to avoid cardiovascular problems.

FUTURE RESEARCH DIRECTIONS

In future there will be more prevalence of hypertension but people can also be more aware of this burden if there is proper usage of information technology. Unfortunately literatures and researches on this risky disease are very low. People will want to know how their elders were affected but they should also take care of getting medications. Many people will move towards prevention and researchers will provide more and more guidelines by their researches. In near future if there is proper usage and management of information technology, then many problems can be sort out. This chapter will also provide background of knowledge, prevention measures and future medications in attracting people attention in knowing relation between hypertension and negative possible outcomes of information technology.

CONCLUSION

The hypertension is difficult to control and cannot be regarded after taking single reading from patient. The patients having control blood pressure decrease the chances of other microvascular and macrovascular complications. In some countries, like in Kenya its probability is one in ten so, an urgent solution must be applied for control in its prevalence. About 50 percent of patients have uncontrolled hypertension so, it give importance of proverb '*prevention is better than cure'*. People spend more time in using mobiles or technology but this comfort also decrease their routine physical activity, gives more stress of data crime and privacy maintenance. People are demanding more and more ease from developing world with little bit activity they should also increase physical activity and should adopt recommended dietary changes. Lifestyle changes and educating people along with family inculcation, counseling and behavioral modifications can play important role in controlling hypertension.

REFERENCES

Abougalambou, A. S., & Abougalambou, S. S. I. (2013). A study evaluating prevalence of hypertension and risk factors affecting on blood pressure control among type 2 diabetes patients attending teaching hospital in Malaysia. *Diabetes & Metabolic Syndrome*, *7*(2), 82–86. doi:10.1016/j.dsx.2013.02.019 PMID:23680246

Ali, N. A., & Feroz, A. F. (2020). Prevalence of hypertension and its risk factors among cotton textile workers in low and middle-income countries. *Systematic Reviews*, *9*(1), 99. doi:10.118613643-020-01364-z PMID:32359375

Asiimwe, D., Mauti, G. O., & Kiconco, R. (2020). Prevalence and Risk Factors Associated with Type 2 Diabetes in Elderly Patients Aged 45-80 Years at Kanungu District. *Journal of Diabetes Research*, *20*(21), 1–5. doi:10.1155/2020/5152146

Aspray, T. J., & Albertii, K. G. M. M. (2002). Physical activity and its relationship with obesity, hypertension and diabetes in urban and rural Cameroon. *International Journal of Obesity*, *26*(1), 1009–1016. PMID:12080456

Aziz, K. U. (2015). Evolution of systemic hypertension in Pakistani population. *Journal of the College of Physicians and Surgeons—Pakistan*, *25*(4), 286–291. PMID:25899196

Basit, A., Tanveer, S., Fawwand, A., & Naeem, N. (2019). Prevalence and contributing risk factors for hypertension in urban and rural areas of Pakistan. *Clinical and Experimental Hypertension*, *42*(3), 218–224. doi:10.1080/10641963.2019.1619753 PMID:31151358

Brown, J. B., Gestring, M. L., Forsythe, R. M., Stassen, N. A., Billiar, T. R., Peitzman, A. B., & Sperry, J. L. (2015). Systolic blood pressure criteria in the National Trauma Triage Protocol for geriatric trauma: 110 is the new 90. *The Journal of Trauma and Acute Care Surgery*, *78*(2), 352–359. doi:10.1097/TA.0000000000000523 PMID:25757122

Bryl, W., Miczke, A., Cymerys, M., Musialik, D. P., & Hoffmann, K. (2007). Prevalence of risk factors in children and youth with primary hypertension. *Atherosclerosis. Supplements*, *8*(1), 122. doi:10.1016/S1567-5688(07)71438-1

Campbell, N. R. C., & Mohan, S. (2009). Hypertension Management Time to Shift Gears and Scale Up National Efforts. *Journal of the American Heart Association*, *53*(1), 450–451. PMID:19204176

Cappuccio, F. P., Micah, F. B., Emmett, L., Kerry, S. M., Antwi, S., Martin-Peprah, R., Phillips, R. O., Plange-Rhule, J., & Eastwood, J. B. (2004). Prevalence, detection, management, and control of hypertension in Ashanti, West Africa. *Hypertension*, *43*(5), 1017–1022. doi:10.1161/01.HYP.0000126176.03319.d8 PMID:15037552

Chuhwak, E. K., Puepet, F. H., Okeahialam, B. N., & Ohwovoriole, A. E. (2002). Hypertension and Diabetes in Jos. *Nigerian Journal of Clinical Practice*, *12*(3), 25–26.

Darbastwar, M., Madhusudan, Ramkumar, T., & Ravinder, A. (2015). A Study of Prevalence of Risk Factors of Hypertension among School Teachers in Central Telangana. *Journal of Evid Based Medical Health, 2*(58), 8935-8939.

Daştan, İ., Erem, A., & Çetinkaya, V. (2017). Urban and rural differences in hypertension risk factors in Turkey. *The Anatolian Journal of Cardiology*, *18*(1), 39. PMID:28430114

Dodani, S., Farooqi, N., Mistry, R. N., Khawaja, F., Qureshi, R., & Kazmi, K. (2004). Prevalence and awareness of risk factors and behaviours of coronary heart disease in an urban population of Karachi. *Journal of Public Health*, *26*(3), 245–249. doi:10.1093/pubmed/fdh154 PMID:15454591

Eguchi, K., Ishikawa, J., Hoshide, S., Pickering, T. G., Shimada, K., & Kario, K. (2007). Masked hypertension in diabetes mellitus: A potential risk. *Journal of Clinical Hypertension*, *9*(8), 601–607. doi:10.1111/j.1524-6175.2007.06610.x PMID:17673881

Eregie, A., Ohwovoriole, A. E., & Unadike, B. C. (2019). Prevalence of hypertension amongst persons with diabetes mellitus in Benin City. *Nigerian Journal of Clinical Practice*, *14*(3), 298–302. PMID:30837415

Gilani, M., Mubarik, S., Malik, S.S., Mubarak, R., & Masood, N. (2019). Hypertension associated risk factors in Pakistan: A multifactorial case-control Study. *JPMA. The Journal of the Pakistan Medical Association*, *69*(1), 1070.

Guenou, D. A., Wanvoegbe, A., Agbodandé, A., Dansou, A., Tchabi, Y., Eyissè, Y., Fandi, A. A. G., & Mousse, L. (2015). Prevalence and risk factors of hypertension in type 2 diabetics in Benin. *Journal of Diabetes Mellitus*, *5*(4), 227–232. doi:10.4236/jdm.2015.54027

Hoffer-Hawlik, M., Moran, A., Zerihun, L., Usseglio, J., Cohn, J., & Gupta, R. (2021). Telemedicine interventions for hypertension management in low-and middle-income countries: A scoping review. *PLoS One*, *16*(7), e0254222. doi:10.1371/journal.pone.0254222 PMID:34242327

Kemche, B., Saha Foudjo, B. U., & Fokou, E. (2020). Risk factors of hypertension among diabetic patients from Yaounde central hospital and Etoug-Ebe Baptist health centre, Cameroon. *Journal of Diabetes Research*.

Kilonzo, S.B., Gunda, D.W., Bakshi, F.A., Kalokola, F., Mayala, H.A., & Dadi,H. (2017). Control of Hypertension among Diabetic Patients in a Referral Hospital in Tanzania: A Cross-Sectional Study. *Control of Hypertention among Diabetic Patients, 27*(5), 473-479.

Kingue, S., Ndongngoe, C., Menanga, A., Fesuh, B., Nouedoui, C., & Muna, W. F. T. (2015). Prevalence and risk factors of hypertension in urban areas of Cameroon: A nationwide population-based cross-sectional study. *Journal of Clinical Hypertension*, *17*(10), 819–824. doi:10.1111/jch.12604 PMID:26140673

Magliah, S. F., Bardisi, W., Attah, M. A., & Khorsheed, M. M. (2021). The prevalence and risk factors of diabetic retinopathy in selected primary care centers during the 3-year screening intervals. *Journal of Family Medicine and Primary Care*, *7*(5), 103–131. PMID:30598943

Meo, S., Usmani, A., & Qalbani, E. (2017). Prevalence of type 2 diabetes in the Arab world: Impact of GDP and energy consumption. *European Review for Medical and Pharmacological Sciences*, *21*(6), 1303–1312. PMID:28387897

Mubarak, F. M., Froelicher, E. S., Jaddou, H. Y., & Ajlounia, K. M. (2008). Hypertension among 1000 patients with type 2 diabetes attending a national diabetes center in Jordan. *Annals of Saudi Medicine*, *28*(5), 346–351. doi:10.5144/0256-4947.2008.346 PMID:18779643

Nayak, B. S., Sobrian, A., Latiff, K., Pope, D., Rampersad, A., Lourenço, K., & Samuel, N. (2014). The association of age, gender, ethnicity, family history, obesity and hypertension with type 2 diabetes mellitus in Trinidad. *Diabetes & Metabolic Syndrome*, *8*(2), 91–95. doi:10.1016/j.dsx.2014.04.018 PMID:24907173

Patel, S. A., Ali, M. K., Alam, D., Yan, L. L., Levitt, N. S., Bernabe-Ortiz, A., Checkley, W., Wu, Y., Irazola, V., Gutierrez, L., Shivashankar, R., Li, X., Miranda, J. J., Chowdhury, M. A. H., Siddiquee, A. T., Gaziano, T. A., Kadir, M. M., & Prabhakaran, D. (2016). Obesity and its relation with diabetes and hypertension: A cross-sectional study across 4 geographical regions. *Global Heart*, *11*(1), 71–79. doi:10.1016/j.gheart.2016.01.003 PMID:27102024

R

Patil, C. R., Sahoo, D. P., Dhoble, M., Kherde, A., & Inamdar, A. (2017). Prevalence of hypertension and its associated risk factors in young adults attending a tertiary care institute of Nagpur: A cross sectional study. *International Journal of Community Medicine and Public Health*, *4*(10), 3630–3635. doi:10.18203/2394-6040.ijcmph20174223

Priya, D., Dudhal, K., Khakse, G. M., Meshram, R., Hiwarkar, P. A., & Wahab, S. N. (2013). Prevalence of hypertension among type 2 diabetes patients attending diabetes clinic at tertiary care hospital, Nagpur. *International Journal of Science. Environmental Technology*, *2*(6), 1401–1406.

Shafi, T. S., & Shafi, T. (2017). A survey of hypertension prevalence, awareness, treatment, and control in health screening camps of rural central Punjab, Pakistan. *Journal of Epidemiology and Global Health*, *7*(2), 135–140. doi:10.1016/j.jegh.2017.01.001 PMID:28188121

Shah, N., Shah, Q., & Shah, A. J. (2018). The burden and high prevalence of hypertension in Pakistani adolescents: A meta-analysis of the published studies. *Archives of Public Health*, *76*(1), 1–10. doi:10.118613690-018-0265-5 PMID:29619218

Shera, A. S., Basit, A., Fawwad, A., Hakeem, R., Ahmedani, M. Y., Hydrie, M. Z., & Khwaja, I. A. (2010). Pakistan National Diabetes Survey: Prevalence of glucose intolerance and associated factors in the Punjab Province of Pakistan. *Primary Care Diabetes*, *4*(2), 79–83. doi:10.1016/j.pcd.2010.01.003 PMID:20149776

Steigerwalt, S. (2008). Management of hypertension in diabetic patients with chronic kidney disease. *Diabetes Spectrum*, *21*(1), 30–36. doi:10.2337/diaspect.21.1.30

Ulasi, I. I., Ijoma, C. K., & Onodugo, O. D. (2010). A community-based study of hypertension and cardio-metabolic syndrome in semi-urban and rural communities in Nigeria. *Bio Medical Central. Health Services Research*, *10*(1), 71. doi:10.1186/1472-6963-10-71 PMID:20302648

Unadike, B. C., Eregie, A., & Ohwovoriole, A. E. (2011). Prevalence of hypertension amongst persons with diabetes mellitus in Benin City, Nigeria. *Nigerian Journal of Clinical Practice*, *14*(3), 300–302. doi:10.4103/1119-3077.86772 PMID:22037073

Yaman, B., Açıkgoz, E., Açıkgoz, S. K., & Çengel, A. (2013). Prevalence of Masked Hypertension in Type 2 Diabetic Patients and Correlation with HbA1c Levels. *Journal of the American College of Cardiology*, *62*(18), 94–97. doi:10.1016/j.jacc.2013.08.291

Yatabe, J., Yatabe, M. S., & Ichihara, A. (2021). The current state and future of internet technology-based hypertension management in Japan. *Hypertension Research*, *44*(3), 276–285. doi:10.103841440-020-00591-0 PMID:33361825

ADDITIONAL READING

Agarwal, R., Bills, J. E., Hecht, T. J. W., & Light, R. P. (2011). Role of home blood pressure monitoring in overcoming therapeutic inertia and improving hypertension control. *Hypertension*, *57*(12), 29–38. doi:10.1161/HYPERTENSIONAHA.110.160911 PMID:21115879

Alzahrani, S. A. (2014). Management of hypertension in diabetes mellitus. *Expert Review of Endocrinology & Metabolism*, *2*(3), 341–357. doi:10.1586/17446651.2.3.341 PMID:30743805

Bhowmik, B., Afsana, F., Ahmed, T., Akhter, S., Choudhury, H. A., Ahmed, T., Mahtab, H., & Khan, A.K. (2015). Obesity and associated type 2 diabetes and hypertension in factory workers of Bangladesh. *Bio Medical Central Research Notes, 8*(1), 460.

Colosia, A. D., Palencia, R., & Khan, S. (2013). Prevalence of hypertension and obesity in patients with type 2 diabetes mellitus in observational studies: A systematic literature review. *Diabetes, Metabolic Syndrome and Obesity*, *6*, 327. doi:10.2147/DMSO.S51325 PMID:24082791

Gijón-Conde, T., Rubio, E., Gorostidi, M., Vinyoles, E., Armario, P., Rodilla, E., & Ruilope, L. M. (2021). 2021 Spanish Society of Hypertension position statement about telemedicine. *Hipertensión y Riesgo Vascular*, *38*(4), 186–196. doi:10.1016/j.hipert.2021.03.003 PMID:33888438

Guasti, L., Dilaveris, P., Mamas, M. A., Richter, D., Christodorescu, R., Lumens, J., & Cowie, M. R. (2022). Digital health in older adults for the prevention and management of cardiovascular diseases and frailty. A clinical consensus statement from the ESC Council for Cardiology Practice/Taskforce on Geriatric Cardiology, the ESC Digital Health Committee and the ESC Working Group on e-Cardiology. *ESC Heart Failure*, *9*(5), 2808–2822. doi:10.1002/ehf2.14022 PMID:35818770

Kario, K., Chia, Y. C., Siddique, S., Turana, Y., Li, Y., Chen, C. H., & Wang, J. G. (2022). Seven-action approaches for the management of hypertension in Asia–The HOPE Asia network. *Journal of Clinical Hypertension*, *24*(3), 213–223. doi:10.1111/jch.14440 PMID:35172037

Malhotra, R., Puone, T., Hoyo, C., & Hughes, G. (2018). Prevalence and awareness of hypertension in an urban township of South Africa: Compelling need for action. *Ethnicity & Disease*, *18*(4), 401–402. PMID:19157241

Viana, S., Salvador, R., Morouço, P., & Rebelo-Gonçalves, R. (2022). The Contribution of Exercise in Telemedicine Monitoring in Reducing the Modifiable Factors of Hypertension A Multidisciplinary Approach. *European Journal of Investigation in Health, Psychology and Education*, *12*(4), 363–386. doi:10.3390/ejihpe12040027 PMID:35447745

KEY TERMS AND DEFINITIONS

Cardiovascular Disease: Disease of heart and blood vessel due to number of factors including hypertension and fat deposition.

Circadian: A rhythm that repeats after every 24 hours.

Data Criminalization: An illegal access to other's data.

Diabetic Retinopathy: Changes in retina due to diabetes mellitus.

Dyslipidemia: Situation of abnormal level of low- and high-density lipoprotein in body that may cause heart problems.

Echocardiography: A test for medical imaging of heart using sound waves.

Masked Hypertension: Person having high blood pressure in office but normal blood pressure in clinic.

Myocardial Infractions: A situation in which not enough blood is reached to heart's muscle and lead to heart attack.

Telemedicine Intervention: Person monitoring his or her own medical condition.