Special Correspondence

Effect of Lifestyle Modification in Control of Hypertension

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Background : Hypertension is a widely prevalent lifestyle disease. Hence it is important to incorporate non-pharmacological changes with pharmacological drugs to prevent and improve its outcomes. This study aims to analyse the relation of lifestyle changes with Hypertension.

Methodology : A questionnaire and consent form was distributed personally and online on Whatsapp amongst 177 people. A total of 125 agreed to participate. Data analysis was done using IBM SPSS. Correlation for MAP *versus* age, years since diagnosis and exercise frequency is done using Kendall's Tau-b. Difference in MAP of those following dietary and exercise recommendation compared to those who are not is done using ANOVA.

Result : A slight positive correlation is present between age and years since diagnosis *versus* MAP. Adherence to exercise regimen and dietary restrictions successfully help lower MAP as per ANOVA. Kendall's Tau-b test also shows a strong negative correlation between frequency of exercise and MAP. Walking and yoga are the most preferred forms of physical activity. Most common dietary restriction include reducing salt intake, avoiding packaged food and eating fresh fruits.

Conclusion : Non-pharmacological lifestyle habits play a huge role in control of hypertension. And this calls for promotion of healthy lifestyle through various means. At an individual level this includes following proper diet, exercise plans and maintaining a healthy body weight. At a community level we have to make lifestyle changes a part of medical curriculum, incorporating healthy habits at an early age and creating awareness about the prevention, control and treatment of Hypertension at a larger scale. People should be motivated and inspired to lead a healthy life along with encouraging their compliance to the medications.

Hypertension is one of the most concerning and common health problems of current times[1]. Most people in their late 30s and 40s are at increasingly high risk for developing Hypertension[2-5] and this makes it even more important to study the various factors that contribute to the development of this major health concern and its disease progression.

Hypertension is considered to be a lifestyle disease that is, a person with highly unhealthy lifestyle is more prone to develop it and that it can be prevented by developing healthy lifestyle habits[6,7]. A high number of lifestyle and genetic factors seem to influence the occurrence and the course of this disease and this gives us an opportunity to prevent it by understanding how each one of these factors is related to hypertension.

A family history of Hypertension makes one more likely to be hypertensive[8,9]. A strong family history for hypertension is also an indication for early intervention to prevent the development of the disease or improve its outcome[10]. Stress, lack of sleep hygiene, unhealthy eating habits (excess consumption of fatty foods), Obesity, Diabetes, Addictions (Alcohol, Smoking, Drugs), Sedentary Life, Lack of Exercise etc, are huge contributors of hypertension. These factors not only contribute Hypertension but also worsen the course of the disease by causing complications[11,12]. Hypertension is a major risk factor for severe diseases like Vascular diseases, Myocardial infarction, Renal diseases, Ischemia and also it also leads to organ failures in cases of hypertensive emergencies[13].

All the previously mentioned lifestyle factors except family history (due to genetic factors) are very much preventable. Thus, Hypertension is one of the most important healthcare problems that needs to addressed immediately in order to ensure a good health amongst the community. There is an alarming need to promote healthy habits like eating healthy foods, exercising, sleeping well, strictly avoiding heavy consumption of alcohol etc in order to prevent this deadly yet preventable healthcare problem.

This study aims at analysing how the various lifestyle factors contribute to development of Hypertension and its progression while promoting

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various practices to prevent this major health problem in the world.

METHODOLOGY

This study has been conducted in Ahmedabad, Gujarat in the months of August-October. The sampling frame aims to include people clinically diagnosed with Hypertension. The participants were asked whether they had a family history of hypertension. People who had a strong history of Hypertension with occurrence of inherited early onset Hypertension and Hypertension despite good dietary and lifestyle choices were not included in the study. This was done to make sure that the majority of the cases in this study are preventable/controllable cases of Hypertension. The questionnaire along with the consent forms were handed out personally as well as distributed online through WhatsApp. After explaining the aim of the study, assuring proper handling of data and addressing concerns the consent forms were signed and the questionnaire was asked to be filled and collected. No personal information has been asked for or used in this study. The questionnaire included questions about Gender, Age, Last recorded Blood Pressure, years since diagnosis of hypertension, dietary changes that have been advised and adhered to, and finally the exercise patterns and frequency followed by the participant. The forms were distributed amongst 177 participants from which 125 agreed to participate in the study, with a response rate of 70.6%.

Data analysis is done using IBM SPSS. The last recorded blood pressure was taken as systolic/diastolic but for data analysis it has been converted to Mean Arterial Blood Pressure (MAP = 2/3 diastolic + 1/3 systolic). Scatter plots of MAP *versus* Age and years since diagnosis are made (Figs 1&2) and Kendall's Tau b coefficient is used to correlate while accounting for heteroskedasticity (Table 1). MAP *versus* Frequency of exercising is shown in Fig 3 with correlation done using Kendall's Tau b coefficient in Table 2. Participants were asked about whether they have been following the advice to exercise regularly (Table 3). The MAP of participants who exercised compared to those who didn't was analysed by ANOVA (Table 4). The participants who exercised were asked about the methods of exercise they preferred, shown in Fig 4 (multiple option selected so total is more than 125). Similarly, adherence to dietary changes was inquired (Table 5) and its effects on MAP analysed by ANOVA are shown in Table 6. Fig 5 shows the different types of dietary restriction implemented (multiple option selected so total is more than 125)

No personal information from the participants was

collected or included in this study.

RESULTS

Out of the 125 responses received in this study 47 (37.6%) are females while 78 (62.4%) are males. The average age of the respondents is 54.5 years with a minimum of 25 years and maximum of 79 years.

Figs 1 & 2 shows that age and years since diagnosis of Hypertension both have a slight positive correlation with Mean Arterial Pressure (MAP). This correlation is shown to be statistically significant as per Kendall's Tau b test in Table 1 ($p<0.05$).

Fig 3 shows how MAP decreases with increasing frequency of exercising (per week), a negative correlation that is shown to be statistically significant as per Table 2. A slight upward rise in MAP is seen among participants who exercise 7 times a week, possible explanations could be adherence to regular exercise secondary to consistently high blood pressure OR they could simply be outliers and an aberration.

Table 3 and 4 shows that the 70 (56%) people who self-report to being adherent to advice of having an active lifestyle and exercising regularly had a
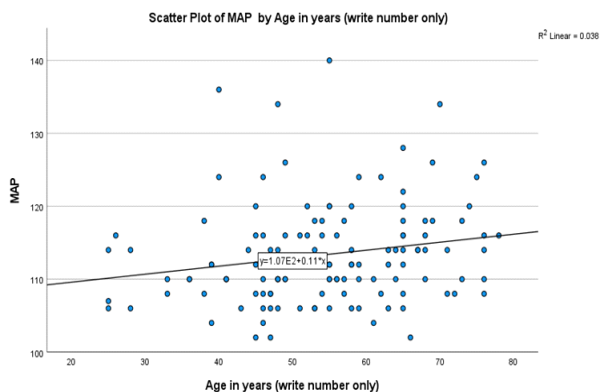

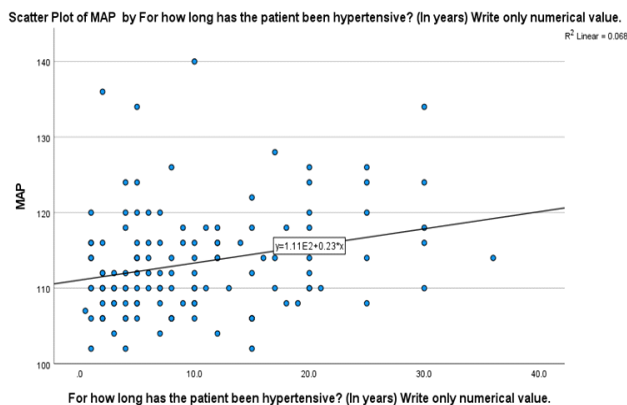Fig 1 — Mean Arterial Pressure *versus* Age

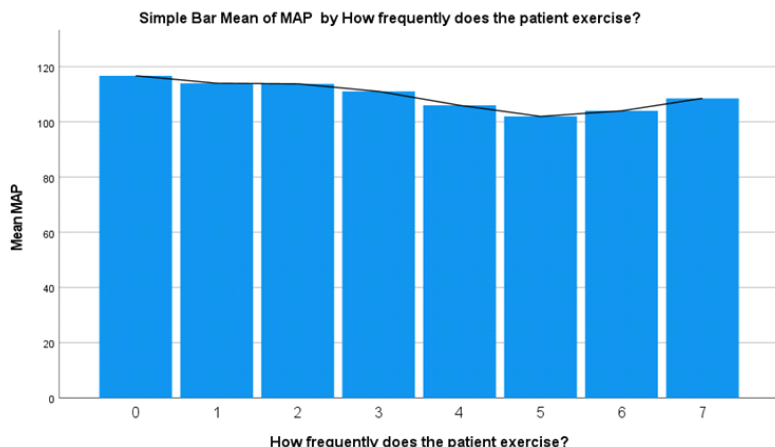Fig 2 — Mean Arterial Pressure *versus* Years since diagnosis

Fig 3 — Mean Arterial Pressure decreases with increasing exercise frequency

significantly better control over their MAP and consequentially their disease progression too. Fig 4 shows us what are the modes of exercise preferred, with walking being the most favoured one. It is important to note here that this graph shows the results to multiple answers allowed (hence the total is more than 125) question posed to the participants who claimed to exercise regularly.

Table 5 and 6 shows that 90 (72%) participants self-reported being adherent to dietary restrictions and were seen to have a significantly lower MAP compared to those who did not follow the dietary advice. Fig 5 shows the results to a multiple answers allowed question posed to participants following dietary restrictions about the changes that they have made regarding their diet. The most common changes were restricting high salt food, avoiding packaged food and eating fresh fruits.

DISCUSSION

Hypertension is a menace to our society with a prevalence of 32-34% worldwide and 28-30% in India. Although it is relatively asymptomatic in most cases it can cause adverse effects on cardiovascular, renal and central nervous system with complications such as Stroke, Aneurysm, Heart Attack, Chronic Kidney Disease, Dementia.

Hypertension has a mortality rate of 13% and also significantly raises the mortality rate in numerous other ailments.

It is important to acknowledge that Hypertension is a vastly multifactorial disease. The parameters analysed in this study though are an important part of control and prevention of this disease. Non pharmacological advice and lifestyle changes to control Hypertension have been in the limelight since the last few decades partly because these are controllable risk factors and can be easily avoided, partly because it is very prevalent[14,15] but also due to worsening dietary and lifestyle habits leading to exacerbation of the problem.

A healthy lifestyle with a regular exercise regimen, Yoga and Healthy Diet is highly beneficial in preventing and improving the outcomes of this disease as seen in this study. Similar results were also found in British Hypertension Society guidelines for Hypertension Management 2004 (BHS-IV): summary[16], a pronouncement called Exercise and Hypertension by American College of Sports Medicine March 2004[17],

Table 1 — Kendall's Tau b test of Mean Arterial Pressure versus Age and Years since diagnosis			MAP	Age in years (write number only)	For how long has the patient been hypertensive? (In years) Write only numerical value.
Kendall's tau_b	MAP	Correlation Coefficient	1.000	0.175**	0.187**
		Sig. (2-tailed)	.	0.006	0.004
		N	125	125	125
	Age in years (write number only)	Correlation Coefficient	0.175**	1.000	0.637**
		Sig. (2-tailed)	0.006	.	<0.001
		N	125	125	125
	For how long has the patient been hypertensive? (In years) Write only numerical value.	Correlation Coefficient	0.187**	0.637**	1.000
		Sig. (2-tailed)	0.004	<0.001	.
		N	125	125	125
** Correlation is significant at the 0.01 level (2-tailed).					

| Table 2 — Kendall's Tau b test of Mean Arterial Pressure versus Exercise Frequency			MAP	How frequently does the patient exercise?
Kendall's tau_b	MAP	Correlation Coefficient	1.000	-0.400**
		Sig. (2-tailed)	.	<0.001
		N	125	125
	How frequently does the patient exercise?	Correlation Coefficient	-0.400**	1.000
		Sig. (2-tailed)	<0.001	.
		N	125	125
** Correlation is significant at the 0.01 level (2-tailed).				
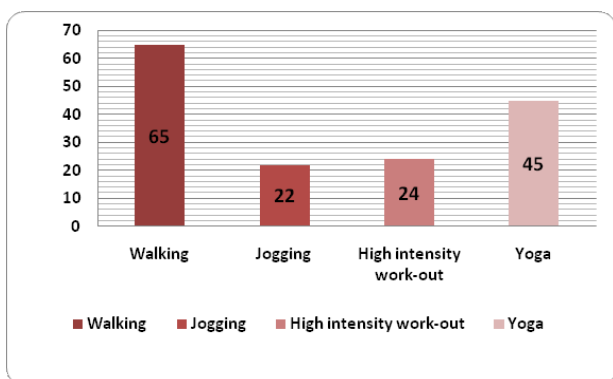
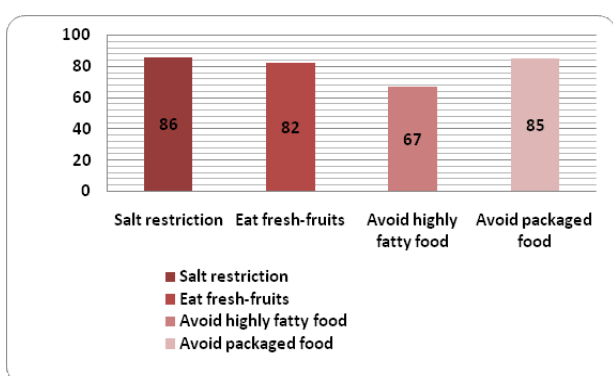Fig 4 — Mode of exercise according to Number of Participants

Fig 5 — Mode of Diet change according to Number of Participants

Table 3 — *Adherence to regular exercise among participants*		
		N
Does the participant exercise?	No	55
	Yes	70

Table 5 — *Adherence to dietary recommendations among participants*		
		N
Is the participant following dietary changes advised?	No	35
	Yes	90

and research named Exercise as Hypertension therapy conducted in Columbia in August, 2001[18].

From the findings of this study and numerous others done before it, it is essential to take steps that act on these findings.

Firstly, let's talk about the changes that can be made as an individual in our own personal habits. An article in the American Journal of Nephrology[19] acts as a guide for the recommendations. These include -

• Regular physical activity of 30 minutes or more on most days of the week. The improvement in BP can be seen irrespective of intensity of exercise (hence high intensity weight lifting is just as effective as simple power walking) and whether the person has ideal body weight (both obese and healthy individuals attain similar gains from the exercise)

• Reduction in salt intake. A reduction in salt intake is an excellent step towards prevention of hypertension in normotensives and control of hypertension in Hypertensives. Salt intake shouldn't exceed 2.3 grams (one teaspoon) in healthy adults. Although patients of Hypertension may need to decrease their intake further.

• Having a diet rich in fruits, vegetables, low fat dairy products and reducing intake of trans fat. Certain diet patterns help reduce BP and although the exact nutrients responsible for that is unknown it is recommended that the patients' diet should be rich in fruits, vegetables and low-fat dairy products. Inclusion of nuts, fish and whole grains are also recommended. Red meat should however be avoided. Diet rich in Potassium, Magnesium and Calcium could help, but results of studies in this aspect have been inconclusive.

• Moderation in alcohol consumption. Many studies link high BP levels to heavy drinkers and it is

Table 4 — *Difference in Mean Arterial Pressure between Participants who claim to do regular exercise versus participants who are sedentary*					
Dependent Variable : MAP					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	376.181[a]	1	376.181	8.100	0.005
Intercept	1588818.869	1	1588818.869	34211.028	<0.001
Does the participant exercise?	376.181	1	376.181	8.100	0.005
Error	5712.331	123	46.442		
Total	1612173.000	125			
Corrected Total	6088.512	124			
a = R Squared = 0.062 (Adjusted R Squared = 0.054)					

Table 6 — *Difference in Mean Arterial Pressure between Participants who follow Dietary*					
Dependent Variable : MAP					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	597.237[a]	1	597.237	13.378	<0.001
Intercept	1319736.757	1	1319736.757	29561.010	<0.001
Is the participant following dietary changes advised?	597.237	1	597.237	13.378	<0.001
Error	5491.275	123	44.645		
Total	1612173.000	125			
Corrected Total	6088.512	124			
a = R Squared = 0.098 (Adjusted R Squared = 0.091)					

recommended that males shouldn't exceed 2 drinks a day and females shouldn't exceed 1 drink per day.

• Maintaining a healthy weight has shown to reduce BP and is highly recommended for patients who are overweight or obese.

The various steps that can be taken to promote these habits at a community level are to encourage medical personnel to emphasize on giving non-pharmacological advice to their patients and explaining its importance to ensure patient compliance to both medications and the lifestyle changes prescribed. Non-pharmacological advice should be made a part of medical education so that the future medical personnel know its importance and incorporate the habit of emphasising on it along with prescribing conventional medications.

Making major lifestyle changes like eating fresh fruits and vegetables, avoiding packaged and junk foods can be difficult initially and so introducing these habits along with a regular exercise regimen and Yoga at a young age can be helpful and can be an important step in the primary prevention of the disease. This can be achieved by educating the children and the youth by including it in their curriculum and through promoting it in mass media too. These practices can be promoted by popular celebrities, social media influencers and role models of the current generation by holding various awareness events, celebrating Yoga weeks, organizing health drives and marathons.

Conclusion

In conclusion we can say that hypertension and its association with voluntary lifestyle choices is undeniable. With the life-threatening consequences of the disease, it is of utmost importance to take decisions which help prevent and control the disease. Working on an individual level is the first hurdle but people can also help others by increasing their awareness and providing scientifically sound advices.

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