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Willingness to Pay for Treatment of Complications Associated with High Blood Pressure Among Hypertensive Patients in Pakistan: A Cross-Sectional Study

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***Abstract*–Background:** Hypertension is the leading cause of cardiovascular mortality and morbidity around the globe. Willingness to pay (WTP) is the technique to evaluate the health care program from the consumer's perspective. This technique is measured and valued for future perspective. The objective of this study is to investigate WTP for treatment of complications associated with high blood pressure among hypertensive patients in Pakistan. **Methods:** A cross sectional observational study was conducted for 6 months from April to September 2019. Well-designed questionnaires were developed to collect information on socio-demographic characteristics, medical belief and hypothetical scenario of willingness to pay. We distributed 320 questionnaires to hypertensive patients in Kashmir institute of cardiology linked with District Head Quarter hospital, Al-shifa hospital Mirpur, Noor memorial hospital & Mohi-ud-Din hospital in Mirpur city, Pakistan. **Results:** We analyzed 280 questionnaires which were correctly and completely filled giving a response rate of 87.5% in which 69.6% were males and 30.4% were females. Around 39.6% of participants were 51-60 years old. About 81.8% were willing to pay for life time. Almost half 52.5% were willing to pay for stoke more than three thousand rupees. Occupation and monthly income had significant effects on WTP for the treatment of complications of hypertension. **Conclusion:** Majority of participants were willing to pay from their monthly income for the management of complications associated with hypertension. This indicates the awareness of patients about the importance of disease management for better healthcare.

Keywords: Willingness-to-pay; High blood pressure; Contingent valuation method; Survey and questionnaires; Azad Kashmir.

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1. Introduction

Hypertension is the leading cause of cardiovascular mortality and morbidity around the globe[1]. It is a risk factor for heart disease, heart attack, and stroke[2].

According to World Health Organization, 1.13 billion people worldwide have hypertension. It is estimated that in Pakistan about 38.7 Million people suffer from hypertension and only 3 % receive proper treatment [3,4]. Smoking, increased intake of caffeine, inappropriate diet routine or junk food, higher salt consumption, less physical activity and aging are risk factors for the prevalence of hypertension in adults. Prevalence of hypertension increases with age as manifested in the Pakistan National Health Survey (PNHS) in which hypertension rose from less than 10% in adolescents to about 60 to 70%% in elderly around 70 years old [5].

In a developing country like Pakistan where literacy rate is about 62.3% and rate of unemployment is 6.7%, the out of pocket (OOP) as a share of current health expenditure is 53.8% of the total national health expenditure [6]. A study conducted in Pakistan shows that the total out of pocket cost of treatment on stage 1 hypertension and stage 2 hypertension were calculated to be 217869.7PKR (US$1000 Approx) and 17545457.6 PKR (US$78,000 Approx) respectively [7].

Willingness-to-pay (WTP) is the valuation of health benefit in monetary terms, this can be used in a cost-benefit analysis. The term WTP may also refer to survey techniques used to derive WTP valuations [8]. Two general approaches to the estimation of WTP values, indirect measurement and direct measurement can be distinguished. The indirect approach examines previous real-world decisions that involve tradeoffs between money and expected health outcomes; for example, implied dollar values by wage premiums accepted by workers in occupations with known increased health risks. In contrast to inferring preferences from actual choices, the direct measurement of WTP uses survey methods to elicit stated dollar values for some non-marketed phenomenon produced or destroyed by the project being evaluated. In economics the direct approach has been termed contingent valuation, because the respondent is being asked to consider the contingency of a

market's existing for the thing being valued [9]. However, although attempts have been made to study the prevalence and associated risk factors of hypertension in Pakistan, literature looking into preferences of patients and related health care services are limited. Therefore, this study aims to explore the WTP for treatment of complications associated with high blood pressure among hypertensive patients in Mirpur and Azad Kashmir in Pakistan.

2. Materials and methods

Study design: a cross sectional descriptive study was conducted to assess information on Socio-demographic factors, medical believes of the patients and hypotheticals scenarios of WTP for the complications of hypertension. Study Setting: the study was conducted in Kashmir institute of cardiology linked with District Head Quarter hospital, Al-shifa hospital Mirpur, Noor memorial hospital & Mohi-ud-Din hospital in Mirpur city. Study Population: the target population was patients suffering from hypertension who are taking antihypertensive medicines. Study Duration: the study was conducted from April 2019 to September 2019. Sample size: non-probability consecutive sampling technique was used for data collection, the total sample size calculated by Raosoft software was 320. Inclusion and exclusion criteria: adult patients diagnosed with hypertension and currently on hypertensive drugs were included. While patients with mental disorder or mentally retard were excluded. Questionnaire: a self-developed semi-structured questionnaire was used to collect the needed information. The questionnaire includes a total of 26 questions out of which 8 questions were demo-socioeconomic factor, 10 questions were related to medical believes and 4 hypothetical scenario each with 2 questions. Questionnaire was translated into the local language. For reliability and validity of the questionnaires, pretest was performed in 5 adult persons from community outside the site of the study. Suggestions were considered and modifications done accordingly. Similarly, equipment for blood pressure measurement, standard and valid instruments were used and quality control was assured. Study variables: we had dependent and independent variables. Dependent variable was hypertension and independent variables were age, sex, occupation and education. Data analysis: Mean, percentages and frequencies were obtained by using SPSS (version 2007). We also used Chi-square to correlate between variables. Results were considered significant if p value is < 0.05.

3. Results

The completely answered questionnaires were 280 out of 320 giving a response rate of 87.5%. Socio-demographic characteristics of respondents: The age range of the respondents was 35-80 years. Out of this range 24.6% aged 41-50 years, 39.6% with the age of 51-60 and 22.5% aged 61-70 years. The majority 69.6% of the respondents were male. About 89.6% were married. Around 35.4% were illiterate, 13.9% were able to read the questionnaire easily, 32.9% were matric pass and 12.5% had intermediate level education. Table 1 represents the socio-demographic data.

About 43.9% of respondents were unemployed and 28.6% were Govt. servant. Around 45.0% had monthly income of less than 20,000 rupees, 42.1% had the income range between 21,000-50,000, 12.1% had the income range between 51,000-100,000, 0.7% had the income > 100,000 rupees. The majority 92.5% had their dependent relatives, 7.5% had no dependent relatives. About 60.0% had 4-5 dependents, 33.2% had ≤ 3 dependents and 6.4% had > 6 dependents. Medical history of the Respondents.

Medical history of the Respondents: Most of participants 40.0% diagnosed with hypertension 1-3 years ago, 22.9% were suffering from hypertension for around 1 year, 21.1% diagnosed with hypertension $\geq$ 3-10 years ago. About half of respondents 55% do not visit health centers regularly for medical assistance. All respondents 100% receive other medical advice from somewhere else. Out of which 35% receive medical advice from another public health centers, 35.4% take advice from private medical health centers, 5.7% take advice from family medical practitioner, 8.6% take medical advice from pharmacy and 7.5% take advice from other sources. The majority of respondents 59.6% believe that the treatment has partial effective, 36.8% believe treatment is effective. Most of respondents 82.9% were WTP for treatment. Around 50.4 % believe that purchase of medication is difficult. Majority 75.4% of respondents had alternative treatment to manage hypertension, herbal drugs 13.2%, religious activities 2.1%, nutritional diet 38.9% and physical exercise 45.7%. Table 2 represents the medical history of the respondents.

Hypothetical scenarios of WTP: To assess the WTP for management of hypertension complications we had four scenarios. The first scenario was retinopathy management. Around 44.6% of participants were WTP more than three thousand rupees followed by 31.4% were WTP between 2001-3000 rupees. The majority of the respondents 81.8% were willing to pay for life time. The second scenario was heart attack management. Around half of respondents 51.8% were WTP more than three thousand rupees, 23.9% were WTP between 2001-3000 rupees. The majority of respondents 81.4% were WTP for life time. The third scenario was management of stroke. About 52.5% were WTP more than three thousand rupees, 26.1% were WTP between 2001-3000 rupees, 10.7% were WTP between 1001-2000 rupees. The majority of respondents 83.2 % were WTP for life time. The fourth scenario was management of kidney failure. Around half of respondents 48.9% were WTP more than three thousand rupees, 30.7% were WTP between 2001-3000 rupees. The majority of the respondent 88.6 % were WTP for life time. Table 3 shows the hypothetical scenarios of the WTP.

Comparative studies: Categorical regression analysis was performed using WTP (Amount in rupees and time) as a dependent variable and 4 comprehensive characteristics of Age, gender, occupation and monthly income as an independent variable.

Comparative study of monthly income with amount of money and time: Data analysis prove the significant effect of monthly income on WTP for the treatment of complications of hypertension. Scenario-1 p=0.002, Scenario-2 p=0.00, Scenario-3 p=0.006, scenario-4 p=0.000. In addition, there was a significant effect between monthly income and duration

Table 1: Socio-demographic characteristics of respondents

Variables	Classification	Frequency	Percentage
Age (Years)	<40	9	3.2
	41-50	69	24.6
	51-60	111	39.6
	61-70	63	22.5
	>70	28	10.0
Gender	Male	195	69.6
	Female	85	30.4
Marital status	Married	251	89.6
	Un-married	9	3.2
	Divorced	7	2.5
	Widowed	13	4.6
Educational qualification	No education	99	35.4
	Can easily read	39	13.9
	Matric	92	32.9
	Intermediate	35	12.5
	Graduation	9	3.2
	Masters	6	2.1
Occupation	Unemployed	123	43.9
	Govt. servant	80	28.6
	Non govt. servant	33	11.8
	Trader	10	3.6
	Agriculture	4	1.4
	Others	30	10.7
Monthly income (PKR)	<20,000	126	45.0
	21,000-50,000	118	42.1
	51,000-1,00000	34	12.1
	>1,00000	2	.7
Dependent relatives	Yes	259	92.5
	No	21	7.5
No. of dependents	<3	93	33.2
	4-5	168	60.0
	>6	19	6.4

of payment. Scenario-1 p=0.007, Scenario-2 p=0.021, Scenario-3 p=0.003, Scenario-4 p= 0.023. Comparative results are presented in table 4 and 5.

Comparative study of occupation with amount and time: There is a significant correlation between WTP and occupation in scenario 2 and 4, p=0.03, p=0.002 respectively. While, there is a significant correlation between occupation and duration of payment. Scenario-1 p=0.001, scenario-2 p=0.003, scenario-3 p=0.002, scenario-4 p= 0.002 Comparative results are presented in table 6 and 7.

4. DISCUSSION

Hypertension is a worldwide disease that cannot be cured but prevented and managed by taking controls on diet and body measures. This study was conducted to assess how much the hypertensive patients are WTP for management of complications related to hypertension. Majority of participants 82.9% were WTP and spend a handsome amount of their monthly income to manage the complications of this disease. Also, majority of respondent's preferred to use alternative treatment especially diet and physical exercise to manage the

Table 2: Medical history of the respondents

Medical History	Classification	Frequency	Percentage
How long have you been diagnosed with high blood pressure?	Recently	20	7.1
	from 1 year	64	22.9
	1-3 years	112	40.0
	3-10 years	59	21.1
	>10 years	25	8.9
Do you regularly visit a healthcare center for medical assistance?	Yes	126	45.0
	No	154	55.0
When was your last visit to a healthcare center?	A week ago,	36	12.9
	2 weeks ago,	100	35.7
	3 weeks ago,	102	36.4
	6 months ago,	28	10.0
	A year ago,	14	5.0
Do you receive any other medical advice from somewhere else?	Yes	280	100
	No	-	-
If yes, where do you get this medical advice?	Another public health care	98	35
	Use of alternative medicines	22	7.9
	Private medical health care	99	35.4
	Family medical practitioner	16	5.7
	Pharmacy	24	8.6
	Other	21	7.5
How do you find the treatment?	Effective	103	36.8
	Partial effective	167	59.6
	Non effective	10	3.6
Are you willing to pay for treatment you receive?	Yes	232	82.9
	No	48	17.1
How convenient has been the purchase of drug financially?	Convenient	130	46.4
	Very convenient	9	3.2
	Difficult	120	42.9
	Very difficult	21	7.5
Do you use alternative treatment?	Yes	211	75.4
	No	69	24.6
If yes then which one of the following?	Homeopathic	37	13.2
	Spiritual	6	2.1
	Physical exercise	128	45.7
	Nutritional	109	38.9

Table 3: Hypothetical scenarios of WTP

Variable	Classification (PKR/Month)	Frequency	Percentage (%)
How much are you WTP for the treatment of this complication (Retinopathy)?	<500	5	1.8
	500-1000	28	10.0
	1001-2000	34	12.1
	2001-3000	88	31.4
	>3000	125	44.6
For how long are you WTP for the treatment of this complication?	6 months	11	3.9
	1 year	19	6.8
	2 years	21	7.5
	Lifetime	229	81.8
How much are you WTP for the treatment of this complication (Heart attack)?	<500	9	3.2
	500-1000	28	10.0
	1001-2000	31	11.1
	2001-3000	67	23.9
	>3000	145	51.8
For how long are you WTP for the treatment of this complication?	6 months	14	5.0
	1 year	21	7.5
	2 years	17	6.1
	Lifetime	228	81.4
How much are you WTP for the treatment of this complication (Stroke)?	<500	5	1.8
	500-1000	25	8.9
	1001-2000	30	10.7
	2001-3000	73	26.1
	>3000	147	52.5
How long are you WTP for the treatment of this complication?	6 months	11	3.9
	1 year	12	4.3
	2 years	24	8.6
	Lifetime	233	83.2
How much are you WTP for the treatment of this complication (Kidney failure)?	<500	4	1.4
	500-1000	24	8.6
	1001-2000	29	10.4
	2001-3000	86	30.7
	>3000	137	48.9
How long are you WTP for the treatment of this complication?	6 months	7	2.5
	1 year	10	3.6
	2 years	15	5.4
	Lifetime	248	88.6

Table 4: Comparative study of Socio-factor (Monthly Income) with Amount in PKR

Monthly income (PKR)		<20000	21000-50000	51000-100000	>100000	*p*-value
Scenario-1	<500	6	1	2	0	0.002
	500-1000	21	5	2	0	
	1001-2000	14	13	3	1	
	2001-3000	35	30	2	0	
	>3000	50	69	25	1	
Scenario-2	<500	3	1	1	0	0.000
	500-1000	22	3	3	0	
	1001-2000	19	10	4	1	
	2001-3000	43	44	1	0	
	>3000	39	60	25	1	
Scenario-3	<500	4	1	0	0	0.006
	500-1000	19	3	3	0	
	1001-2000	17	9	4	0	
	2001-3000	34	36	3	0	
	>3000	52	69	24	2	
Scenario-4	<500	3	1	0	0	0.000
	500-1000	20	2	2	0	
	1001-2000	17	9	3	0	
	2001-3000	43	42	1	0	
	>3000	43	64	28	2	

Scenario-1* is related to Heart attack, Scenario-2* is related to Retinopathy, Scenario-3* is related to Stroke, Scenario-4* is related to Kidney failure.

Table 5: Comparative study of Socio-factor (monthly income) with time

Monthly income (PKR)		<20000	21000-50000	51000-100000	>100000	*p*-value
Scenario-1*	6 months	11	2	1	0	0.007
	1 year	11	7	2	1	
	2 years	7	4	6	0	
	Life time	97	105	25	1	
Scenario-2*	6 months	7	3	0	1	0.021
	1 year	11	5	3	0	
	2 years	7	9	5	0	
	Life time	101	101	26	1	
Scenario-3*	6 months	9	2	0	0	0.003
	1 year	7	3	1	1	
	2 years	8	9	7	0	
	Life time	102	104	26	1	
Scenario-4*	6 months	5	2	0	0	0.023
	1 year	9	1	0	0	
	2 years	5	7	2	1	
	Life time	107	108	32	1	

Scenario 1* Heart attack, Scenario 2* Retinopathy, Scenario 3* Stroke, Scenario 4* Kidney failure.

Table 6: Comparative study of occupation with amount in PKR

Occupation		Unemployed	Govt. servant	Civil servant	Trader	Farmer	Others	*p*-value
	PKR							
Scenario-1*	<500	5	2	0	0	1	1	0.132
	500-1000	17	5	1	1	0	4	
	1001-2000	14	7	3	3	0	4	
	2001-3000	28	15	14	1	1	8	
	>3000	59	51	15	5	2	13	
Scenario-2*	<500	3	1	0	0	1	0	0.030
	500-1000	14	5	2	1	0	6	
	1001-2000	16	7	4	4	0	3	
	2001-3000	40	25	14	0	1	8	
	>3000	50	42	13	5	2	13	
Scenario-3*	<500	4	0	0	0	1	0	0.071
	500-1000	14	6	1	1	0	3	
	1001-2000	10	6	4	2	1	7	
	2001-3000	32	21	11	3	1	5	
	>3000	63	47	17	4	1	15	
Scenario-4*	<500	3	0	0	0	1	0	0.002
	500-1000	14	7	1	0	0	2	
	1001-2000	11	5	3	2	1	7	
	2001-3000	42	18	15	1	1	9	
	>3000	53	50	14	7	1	12	

Scenario-1* is related to Heart attack, Scenario-2* is related to Retinopathy, Scenario-3* is related to Stroke, Scenario-4* is related to Kidney failure. PKR-Pakistani Rupees*

Table 7: Comparative study of Socio-factor (Occupation) with Time

Occupation		Unemployed	Govt. servant	Civil servant	Trader	Farmer	Others	*p*-value
Scenario-1*	6 months	8	2	1	1	1	1	0.001
	1 year	8	3	2	1	0	7	
	2 years	8	2	2	4	0	1	
	Life time	99	73	28	4	3	21	
Scenario-2*	6 months	7	1	1	1	1	0	0.003
	1 year	8	4	3	0	0	4	
	2 years	5	4	4	4	0	4	
	Life time	103	71	25	5	3	22	
Scenario-3*	6 months	6	3	1	0	1	0	0.002
	1 year	6	1	1	2	0	2	
	2 years	7	5	2	4	0	6	
	Life time	104	71	29	4	3	22	
Scenario-4*	6 months	5	1	0	0	1	0	0.002
	1 year	6	1	1	0	0	2	
	2 years	2	3	3	3	0	4	
	Life time	110	75	29	7	3	24	

Scenario-1* Heart attack, Scenario-2* Retinopathy, Scenario-3* Stroke, Scenario-4* Kidney failure.

complications. Patients were highly motivated for the disease management and they were willing to pay US $3-35.

Hypertension led to serious complications like retinopathy, stroke, heart failure and kidney failure. This study demonstrates WTP for such complications. This study results reveals that around half of respondents 44.6% with monthly income >100000 PKR are WTP US $3-35 for retinopathy induced by hypertension and around 81.8% WTP for life time. Previous study in Taiwan showed that around 65.3% WTP for retinopathy and the amount was estimated to be 468.9±327.7 New Taiwan Dollars[10].

Cardiovascular diseases such as stroke and heart failure are more likely to occur as complications of hypertension than retinopathy or kidney failure. WTP for management of cardiovascular complications was high compared to retinopathy. Around 51.8% of respondents were WTP for heart failure and 81.4% were WTP for lifetime. According to questionnaire and income grading, patients spent US $3-35 per month in Mirpur city of Azad Jammu & Kashmir. A study conducted in Australia showed that population with heart failure complications induced by hypertension were WTP around AUS $40-150[11].

Wang G and colleagues concluded in their study that patients with stroke were WTP for the treatment of this complication around US $3-35[12]. Study in Taiwan showed that people WTP almost half of their monthly income to treat stroke and that is estimated to be US $363-2182. In 1993, Johannesson reported that cardiovascular patients in Sweden WTP for antihypertensive therapy US $130 per month which is equal to 800 Swedish Kroners [13]. Ramsey *et al* conducted a similar study in United States and found that patients were WTP US $93 per month[14]. The value was lower in Japan US 75$ per month.

This study revealed patients with kidney failure complications spend almost US $3-35 per month, while a study in United States showed that patients with high monthly income US $≥ 50,000 are more likely WTP for their disease complications than patients with lower monthly income US $< 50,000[15].

One of the significant factors to consider to assess WTP for disease complications management is the monthly income as it has a significant impact on WTP. Having a family is another important factor to consider as patients wanted to treat their disease complications to be able to support their family.

Willingness to pay (WTP) studies can provide valuable information on patients' preferences and values, which can help health care decision-makers to develop programs and allocate resources properly. Such studies can also provide insights into the economic burden of hypertension-related complications and the impact of treatment on patients' quality of life and financial well-being. There are numerous restrictions on this study that must be recognized. The hypothetical bias cannot be ruled out, referring to the discrepancy between the hypothetical WTP stated by respondents and the actual amount they would pay. It has been well documented in systematic reviews that hypothetical WTP values systematically overestimate the actual payments[16]. The responses depended on truthfulness of the respondents which were assumed to be reliable. In addition, this study was carried out only in one location, it might not represent the whole population of the country, or other districts.

5. Conclusion

This study revealed that most of participants were WTP to manage the complications of hypertension. There is a need to increase awareness and knowledge about the chronicity of non-communicable diseases, so that patients will take responsibility of their health and pay the necessary cost. Expanding the universal coverage of health insurance will assist patients who are not able to provide cash for health care when necessary. Further research and improvement of alternative therapy is imperative, as it seems to be one of the preferred treatment options to hypertensive patients.

Conflict of interests: The authors declare that they have no competing interests.

Authors' contributions: HB and AS performed data collection, reviewed the literature, and data analysis, and wrote the draft manuscript. HB and MB conceptualized and designed the study, coordinated, supervised, analyzed the data, critically reviewed the manuscript to improve intellectual content, and assisted in the final manuscript review. The authors read and approved the final manuscript.

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