The Moderating Effect of Demographics on Patient Adherence and Beliefs

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ABSTRACT

Medication adherence is a complex behavior, and interventions are often used for increasing the adherence of patients. Demographic characteristics are essential for any research. This study tries to find the mediating effect of selected demographic factors on patient adherence and beliefs. The study is empirical and tries to highlight the difference in adherence and beliefs of the patient in the state of Sikkim in India based on gender, place of dwelling, education level, and income of the patients. It was found that medication adherence and beliefs of patients significantly differ based on their demographic characteristics. The importance given to the physician instruction varies mainly based on the gender and dwelling location of the patients. Patients who fall into the category of retired servicemen/women are more adherent than others. Income also plays an essential role in adherence. Gender differences occur for exercising behavior of patients, and education level affects the beliefs of patients towards themselves and for their responsibilities.

KEYWORDS

Demographics, Diet, Education, Exercise, Income, Medication Adherence, Patient Beliefs, Side Effects, Sikkim, Weight Gain

INTRODUCTION

As defined by (Sabaté, Sabaté, & others, 2003), medication adherence is "the degree to which a person's behaviour corresponds to the recommendations made by a health care provider". It is a vital part of patient care and necessary for accomplishing proper clinical outcomes. In its report in 2003, World Health Organization reported that "increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatment" (Sabaté, Organization, & others, 2001). It is reported that hospitalization rates are double for patients who do not comply with their medication. According to (Sullivan, 1990) hospital admission rates attributed to non-adherence ranged between 2.9% to 19.5%. According to (Fenton,

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Blyler, & Heinssen, 1997), patients take 50 to 60% of prescribed medicines. The work of (Matsui, 2013) on patients suffering from diabetes and heart disease confirms that for non-adherent patients, the frequency of emergency room visits, mortality and hospitalization rates are higher (Sabaté et al., 2003). Demographic factors have always played an essential role in every research (Vermeire, Hearnshaw, Van Royen, & Denekens, 2001). This study tries to find the moderating effect of few selected demographic factors on medication adherence and beliefs of patients suffering from different types of diseases in the State of Sikkim in India.

The adherence rate is lower for patients with chronic diseases than those with acute conditions (Osterberg & Blaschke, 2005). A strong correlation has been found between treatment procrastination and medication non-adherence (Fenton et al., 1997). Studies report that increase in duration, cost (Chapman, Yeaw, & Roberts, 2010), frequency, dose complexity (Ingersoll & Cohen, 2008) and weight gain (Beerendrakumar, Ramamoorthy, & Haridasan, 2018; Manhas et al., 2019) are positively correlated with non-adherence. The disease is aggravated when patients regularly miss their medication (Wan, Gu, & Ni, 2020). (García-Herrero, Mariscal, García-Rodríguez, & Ritzel, 2012) reported that patients falling into the category of office goers frequently fail to adhere to their medication regime because of working situations. Ensuring medication regime timing helps in recovery (Harris, Fry, & Fitzpatrick, 2019) but deferring from the scheduled time of medication is common among patients (Sharkness & Snow, 1992; Webb, Horne, & Pinching, 2001). This behaviour of patients is positively associated with non-adherence (Garaix, Stern, Lamy, Dubel, & Kamar, 2018). Approximately 50% of the patients suffering from hypothyroid in Nepal deferred from their scheduled time of medication. Missing the dose was reported for 41.49% of the patients, while 16.81% accounted for discontinuation (Shakya Shrestha, Risal, Shrestha, & Bhatta, 2018).

The research aims to find the mediating effect of demographic factors like gender, place of dwelling, education level, occupation and income level of patients on their medication adherence and beliefs. The study is empirical and tries to highlight the difference in patient adherence and beliefs in the state of Sikkim in India. Sikkim is a small hilly state in India where the predominant tribes consist of Nepalese, Bhutia and Lepchas (Gupta, Jh, Sharma, Saha, & others, 2020). Service members and business community people from various states of India have also settled in this state. There is limited literature on the beliefs and medication adherence behaviour of the inhabitants of this state. Hence, this research aims to bridge the gap.

BACKGROUND

Gender is an essential demographic characteristic, which has been used in other research, and it has been found that the characteristics of males and females differ (Pandey, Saha, & Jha, 2021) (Pandey, Saha, Mukherjee, Pandey, & Jha, 2020). Males are generally more carefree, daring and spend most of the time out of their house (Courtenay, 2000; Fletcher, Pande, & Moore, 2018). In India, men are generally associated with earning and outside the housework. They have adventurous habits and are generally the deciders of essential things, events, and family purchases. On the other hand, females are typically associated with calm nature, loving, caring, homemaker, and household activities (Borkotoky & Unisa, 2015). They are generally soft, gentle, and followers of the decision made by males. This scenario is common across India. However, these differences might not be accurate for each individual but show a general tendency.

People's dwelling places are an attractive demographic factor as people of different places have different habits, lifestyles, beliefs, and practices (Atalla, Pinto, Mielke, Benatti, & Gualano, 2019). City dwellers' lifestyle is fast, sophisticated, luxurious, and complicated, while those who live in villages or rural areas are simple, slow and moderate. People's beliefs in the cities and villages also differ (García, Gilchrist, Vazquez, Leite, & Raymond, 2011; Chen & Chen, 2020; Ma et al., 2020). People residing in the rural areas mainly have beliefs and faith-driven by religion and dictum of the

elders. In contrast, science and advanced media drive city dwellers' belief like television, the internet, and society.

Education has always been an essential parameter for the segmentation of human beings. People with higher levels of education have different beliefs than those with lower levels. Education has been highly correlated with the income level of individuals. Nature of job, levels of stress related to work and lifestyle of individuals greatly depend on education level (Fields, 1980). Research suggests that patients' education level affects the adherence level of patients (Courtenay, 2000; Isacson & Bingefors, 2002).

Occupation of the people is directly related to their lifestyle, eating, sleeping and spending habits. The type of job an individual does impacts his/her family need for achievement and socialization habits (Tarcan, Tarcan, & Top, 2017). Risks, travel, fatigue level and stress levels determine how an individual will react towards his/her health or the health of the family member (Erdamar & Demirel, 2016). Hence, it is an important parameter, which needs to be explored concerning medication adherence.

Based on the level of income, people can be segregated, and it has been found that income level dramatically influences people's habits (Fields, 1980). People with high income travel more, party regularly, use high-end gadgets and are more satisfied with their life (Howell, Howell, & Schwabe, 2006). They spend more on insurance, avail treatment from private practitioners and go to high-end hospitals. People with low income often do not purchase the entire course of prescribed medication. They buy only the bare minimum, and when they feel better, they stop their medication and do not continue further (Maj et al., 2020). Medication adherence and beliefs of patients are affected by patients' income level (Isacson & Bingefors, 2002).

For this study, four critical factors have been taken: "Importance", "Beliefs", "Side effect", and "Adherence". The "Importance" that patients associate with the instruction given by their physician is vital because this determines whether the patient will follow the instruction or not. Instruction like medication, food habit, exercise, medication dose, frequency and lifestyle changes are essential for effective treatment and recovery. Hence, for proper adherence, patients must give due importance to all the physician's instruction.

The beliefs of patients towards their responsibilities, self-esteem, self-care, living an everyday and long life are essential (Furnham, Badmin, & Sneade, 2002) (Prichard & Tiggemann, 2005; Tiggemann & Williamson, 2000). If parents want to be self-dependent and responsible, then they will give due importance to the instructions given by their physician and adhere to the medication regime. If they do not comply and remain bedridden, they will not fulfil their responsibilities. Hence, patients' positive and high beliefs towards their life and responsibilities are essential for achieving higher adherence rates.

Patients' perception of the medication's side effect has always been a concern for the physicians, caretakers, and other stakeholders (DiBonaventura, Gabriel, Dupclay, Gupta, & Kim, 2012). Patients who care more about medication's side effect are more likely to discontinue the medication in case of adverse side effects (O'Brien, Petrie, & Raeburn, 1992). If patients are educated that mild side effects may be caused due to the use of certain medicines, they may continue the medication for the greater good.

METHODOLOGY

The ethical committee of Sikkim Manipal Institute of Medical Sciences permitted the conduct of this research. Written permission was taken from the Medical Superintendent of Central Referral Hospital, Tadong, Sikkim, to interview the patients. The survey's objectives were informed to the patients, and their written consent was taken before conducting the survey. A structured questionnaire was developed for each factor under consideration for the study. Five variables were identified for each of the factors "Beliefs" and "Side Effect" and four variables for "Importance". Questions were

framed on a 10-point scale (1 being lowest and 10 being highest). Eleven variables were identified related to "Adherence". Compliance with these variables was determined with the Likert scale's help, as described in table 1. Five experts validated the questionnaire for checking the face validity, appropriateness and completeness. Five hundred fourteen patients suffering from different types of diseases were surveyed by contacting them. At the same time, they had come to visit Central Referral Hospital, Tadong, Gangtok, Sikkim, for consulting the physician. Questions were asked in the local language Nepali to all the patients. The illustration in figure 1 shows the steps used for the analysis of t-test and ANOVA for determining the association between the variables and groups understudy in the study.

ANOVA ANALYSIS AND DISCUSSION

The description for each variable, maximum and minimum values, mean and standard deviation, is given in Table 1. From the table, it can be seen that for the factor "importance", the mean of all the variables is above nine except "Following diet" (8.89). That indicates that patients, on average, feel that following diet as per the doctor's instruction is comparatively less important than the other variables taken for the study. For the factor "Beliefs", the mean for the variable "Normal life" is highest (8.77) while it is lowest for the variable "Bedridden" (7.84). That implies that patients assign more importance to the belief that continuing medication will help them live an everyday life but gives comparatively lesser extent to bedridden.

On comparing the mean of the variables of the factors "importance", "beliefs", and "Side effects," it is found that the means are highest for the factor "importance" and lowest for "Side effects". That implies that patients do not wish to continue medication if there are side effects to the medication. That is a typical behaviour experienced in patients that if patients understand that a particular medication is giving them discomfort, they tend to discontinue the medication. On asking the patients what they do when they experience any side effect of the medication, They reported that they consult the physician and ask them to change it or stop taking it. On comparing the means of the different variables identified for the factor "Side effect," it is found that the maximum importance is given to the variable "Weight gain" (6.28) and lowest to "Rashes" (4.27). "Weight gain" as a side effect of any medication is a slow process, and patients take a long time to realize that the effect has taken place.
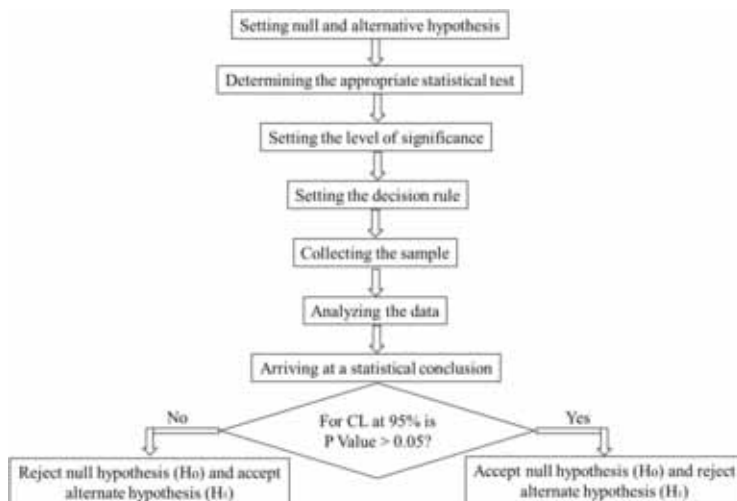
Figure 1. Steps used for t-test

Table 1. Description of Variables

Sl No.	Factors	Variables	Description	Minimum	Maximum	Mean	Std. Deviation
1	Importance	Course	How important is it for you to complete the course of medication?	1	10	9.21	1.507
2		Timing	How important is it for you to follow the timing of medication?	1	10	9.15	1.559
3		Instructions	How important is it for you to follow the instructions of the doctor?	1	10	9.38	1.117
4		Following diet	How important is it for you to follow the diet as prescribed by the doctor?	1	10	8.89	1.562
5	Beliefs	Normal life	How important is it for you to continue medication so that you can have an everyday life?	1	10	8.77	1.756
6		Long life	How important is it for you to continue medication so that you can have a long life?	1	10	8.54	1.987
7		Bedridden	How important is it for you to continue medication so that you are not bedridden?	1	10	7.84	2.220
8		Responsibilities	How important is it for you to continue medication so that you can fulfil your obligations?	1	10	8.06	2.223
9		Self-dependent	How important is it for you to continue medication so that you remain self-dependent?	1	10	8.00	2.240
10	Side Effect	Weight gain	How important is it for you to continue medication even when you gain weight due to its side effect?	1	10	6.28	2.657
11		Tired or dizzy	How important is it for you to continue medication even when you feel tired or dizzy due to the medication's side effect?	1	10	5.65	2.911
12		Gas	How important is it for you to continue medication even when gas is formed due to the medication's side effect?	1	10	5.46	2.971
13		Stomach	How important is it for you to continue medication even when you get stomachache due to the medication's side effect?	1	10	4.94	2.962
14		Rashes	How important is it for you to continue medication even when rashes are formed on your skin due to the medication's side effect?	1	10	4.27	3.020

Table 1. Continued

Sl No.	Factors	Variables	Description	Minimum	Maximum	Mean	Std. Deviation
15		Forgot	Do you forget to take medication completely? Not at all – 4, Sometimes – 3, Most of the time - 2 Always - 1	1	4	3.11	0.625
16		Later	Did you miss medication but took it later? Not at all – 1, Sometimes – 2, Most of the time -3 Always - 4	1	4	2.09	0.816
17		Ran out	Did you run out of medication? Not at all – 4, Sometimes – 3, Most of the time - 2 Always - 1	1	4	3.47	0.701
18		Purpose	Did you miss medication on purpose? Not at all – 4. Sometimes – 3, Most of the time - 2 Always - 1	1	4	3.54	0.654
19		Control diet	Do you control your diet? Not at all – 1, Sometimes – 2, Most of the time - 3 Always - 4	1	4	2.65	0.878
20	**Adherence**	Exercise	Do you exercise regularly? Not at all – 1, Sometimes – 2, Most of the time - 3 Always - 4	1	4	2.38	1.045
21		Times missed	How many times did you miss medication this week? Do not miss at all – 5, Once – 4, Twice – 3, 3 - 4 times – 2, More than five times - 1	1	5	4.01	1.023
22		Miss time	What is the time duration by which you deferred from the scheduled time of medication? Not at all – 3, Yes, miss by few minutes (up to 30 minutes) – 2, More than 30 minutes - 1	1	3	2.10	0.686
23		Defer	How often do you defer from the scheduled time of medication? Not at all – 5, Rarely – 4, Sometimes – 3, Most of the time – 2, Always - 1	1	5	3.79	0.821
24		Stopped	Did you stop medication voluntarily? Yes -1, No - 2	1	2	1.61	0.489
25		Course Completion	Did you complete the course of medication? Yes always – 4, Most of the time – 3, Sometimes – 2, Not at all - 1	1	4	3.28	0.934

They also feel that weight gain is a better trade-off when the disease is cured with medication. Hence, the importance given to continuing medication even in case of weight gain is more. Formation of "Rashes" is a quick process and is readily visible. The discomfort caused makes the patient think, and they quickly correlate the phenomenon with the medication they have taken recently. Also, patients do not want to continue medication which gives them some other kind of discomfort.

On comparing the different variable for the factor "Adherence", we find that the scores are minimum for "Control diet" and "Exercise". That implies that controlling diet and exercising are not commonly practised by the patients at Sikkim. Although the score for the variables "Following diet" and "Instructions" for the factor "Instruction" is high, the actual scores for "Control diet" (2.65) and "Exercise" (2.38) are very low. That implies that the patients know that controlling diet and doing exercise is essential for them and have been instructed by physicians, but they do not comply with it. Lethargy, business in their daily schedule, weather condition, lack of a partner for exercise and lack of support and motivation from the family have all been attributed to lack of adherence for exercise and diet control among the patients.

Table 2 provides a comparative view of the (p-values) of the different demographic factors taken in the study viz: gender, dwelling, education, occupation and income for the different variables. The significant p-values (<0.05) for which the null hypothesis (H_o) is rejected and the alternate hypothesis that the means are not equal (for t-test) and there is at least one group whose means are different (ANOVA) are highlighted in Table 2 and the following tables. For the factor, "importance" difference in means is found only for gender (Timing and Following diet) and dwelling (Course and Following diet). Still, the ANOVA test for education, occupation and income does not find any significant difference between the different groups taken into consideration for each of the demographic factors.

For the factor "beliefs", the means are different for "Normal life" and "Bedridden" concerning gender. Simultaneously, there is no significant difference between the means concerning the respondents' dwelling habitat and occupation. There is a difference in means between at least two groups concerning education for all variables. For the factor "Side Effect", there is no significant difference between the means of gender and occupation. For the variables "Gas" and "Rashes", there is no significant difference between the means for any of the demographic factors taken into consideration for the study. Interestingly, there is no significant difference between the male and female means for any of the factor "Side Effect" variables. There is no significant difference between the means of the different levels of occupation across the variables for the factors "Importance", "Beliefs", and "Side Effects".

Gender

The variables which had a significant difference between the means for different levels of "Gender" (as shown in Table 1) are analyzed based on the actual means of males and females and is shown in Table 3. As shown in Table 3, the means are high for females than males for the factors "Timing", "Following diet", "Normal life", "Ran out", "Purpose" and "Stopped". Similar results were found in other studies that men discontinue their medication more frequently (Maj et al., 2020). Females adhere to proper timing for most of the activities than males. Their natural tendency to care for their family, others and themselves can be attributed to the scores for these variables being higher than males.

On the other hand, men are more carefree and do not like to follow instructions. It is challenging to retain men in the house; hence believing that proper medication will not make them bedridden is higher than females. Women are more forgetful than men, and therefore they miss their time of medication more than men. Men stop their medication voluntarily than women and run out of their medication more often than women. These differences might not be true for each individual but show a general tendency. Men are generally more energetic than women (Azevedo et al., 2007); hence they exercise more. Earlier research also validates that males and females differ in exercise habits (Lustyk, Widman, Paschane, & Olson, 2004; Tiggemann & Williamson, 2000). Literature also suggests that

Table 2. Comparison of significance (p-values) of demographic factors

Sl.No	Factors	Variables	t-test		ANOVA		
			Gender	Dwelling	Education	Occupation	Income
1	Importance	Course	0.176	0.000	0.902	0.900	0.480
2		Timing	0.017	0.215	0.368	0.980	0.857
3		Instructions	0.880	0.054	0.124	0.533	0.949
4		Following diet	0.008	0.000	0.888	0.326	0.450
5	Beliefs	Normal life	0.004	0.540	0.023	0.607	0.000
6		Long life	0.626	0.179	0.000	0.116	0.052
7		Bedridden	0.016	0.717	0.000	0.980	0.096
8		Responsibilities	0.097	0.218	0.000	0.882	0.004
9		Self-dependent	0.076	0.195	0.007	0.757	0.007
10	Side Effect	Weight gain	0.564	0.004	0.080	0.051	0.013
11		Tired or dizzy	0.806	0.826	0.000	0.533	0.312
12		Gas	0.752	0.908	0.777	0.526	0.650
13		Stomach	0.566	0.712	0.013	0.960	0.246
14		Rashes	0.116	0.341	0.280	0.945	0.117
15	Adherence	Forgot	0.040	0.305	0.247	0.002	0.170
16		Later	0.599	0.000	0.000	0.834	0.000
17		Ran out	0.015	0.706	0.642	0.018	0.598
18		Purpose	0.000	0.105	0.034	0.200	0.189
19		Control diet	0.503	0.092	0.675	0.005	0.350
20		Exercise	0.015	0.000	0.037	0.000	0.612
21		Times missed	0.462	0.045	0.022	0.285	0.629
22		Miss time	0.021	0.014	0.012	0.453	0.113
23		Defer	0.328	0.039	0.093	0.112	0.150
24		Stopped	0.000	0.438	0.002	0.144	0.002
25		Course Completion	0.497	0.000	0.015	0.012	0.003

Table 3. Comparison of means for males and females

Sl.No	Variables	Gender	Mean	Sl.No.	Variables	Gender	Mean
1	Timing	Male	9.04	6	Ran out	Male	**3.43**
		Female	**9.33**			Female	3.54
2	Following diet	Male	8.76	7	Purpose	Male	**3.50**
		Female	**9.08**			Female	3.62
3	Normal life	Male	8.64	8	Exercise	Male	**2.50**
		Female	**8.97**			Female	2.18
4	Bedridden	Male	**7.89**	9	Miss time	Male	2.16
		Female	7.77			Female	**2.02**
5	Forgot	Male	3.16	10	Stopped	Male	**1.58**
		Female	3.**03**			Female	1.66

women are less adherent than men (Chan et al., 2010; Granger et al., 2009; Beardon, McGilchrist, McKendrick, McDevitt, & MacDonald, 1993).

Dwelling

The detailed analysis based on the dwelling habitat of survey respondents (as shown in Table 4) reveals that patients living in the urban areas give more importance to the instructions given by their physicians. It is seen for the variables "Course" (9.33) and "Following Diet" (9.02) that the mean of the urban dwellers is significantly more than the rural. People living in the rural areas are considerably less conscious about their weight gain due to a medication side effect than the urban patients and continue their medication. Urban patients take their medication later, more often than rural patients. Urban patients miss more of their medication and miss the timing of their medication, and hence, they defer from the timing of their medication more often than the rural patients. That may be attributed to the busy job schedule they have or due to the busy city life. Rural patients exercise more than urban patients do. That may be because their work area is extensive and they have to move around a lot. During the survey, they found that they walk great distances to earn their livelihood, thus exercising inculcated in their lifestyle. The urban patients are confined to a small area and use modern transport facilities for work. Exercising, for them, is a choice, and they may or may not do it. The course completion rate is lower for the rural patients as compared to the urban patients. The reasons for higher non-adherence among the rural patients may be due to the lesser number of pharmacies and difficulty accessing them. They need to travel great distances to move to the nearest pharmacy centres to fill their prescription.

Education

A detailed analysis of the significant difference in means between the groups, based on patients' education level, is shown in Table 5. The importance of continuing medication for having a normal life, long life, not being bedridden, fulfilling responsibilities, and being self-dependent is significantly more among patients who had their education up to school level. It is considerably higher than the patients having graduate and master's degree. That may be because patients with only a school level of education feel that they have more to achieve in their life in terms of educational qualification, a better job, salary and other things associated with it. On the other hand, people with masters and graduate degrees are better settled in their lives than those with lesser education levels. Literature reveals that income, satisfaction, and necessities increase with increased education levels (Metle, 2001).

Table 4. Comparison of means for rural and urban dwellers

Sl.No	Variables	Dwelling	Mean	Sl.No.	Variables	Dwelling	Mean
1	Course	Rural	8.99	6	Times missed	Rural	4.12
		Urban	**9.33**			Urban	**3.95**
2	Following diet	Rural	8.62	7	Miss time	Rural	2.17
		Urban	**9.02**			Urban	**2.07**
3	Weight gain	Rural	**6.38**	8	Defer	Rural	3.87
		Urban	6.23			Urban	**3.75**
4	Later	Rural	2.21	9	Course Completion	Rural	**3.09**
		Urban	**2.03**			Urban	3.37
5	Exercise	Rural	**2.49**				
		Urban	2.32				

Table 5. Comparison of means based on different education levels

Sl No.	Variables	Mean			Education		Sig.
		School	Graduate	Masters			
1	Normal life	**9.11**	8.78	8.55	School	Graduate	0.175
						Masters	0.008
					Graduate	Masters	0.404
2	Long life	**9.19**	8.49	8.22	School	Graduate	0.001
						Masters	0
					Graduate	Masters	0.388
3	Bedridden	**8.63**	7.64	7.59	School	Graduate	0
						Masters	0
					Graduate	Masters	0.977
4	Responsibilities	**8.8**	7.97	7.74	School	Graduate	0.001
						Masters	0
					Graduate	Masters	0.579
5	Self-dependent	**8.48**	8.06	7.66	School	Graduate	0.164
						Masters	0.004
					Graduate	Masters	0.195
6	Tired or dizzy	4.66	**6.13**	5.72	School	Graduate	0
						Masters	0.008
					Graduate	Masters	0.31
7	Stomach	4.24	**5.23**	5.05	School	Graduate	0.016
						Masters	0.068
					Graduate	Masters	0.804
8	Later	**2.39**	1.94	2.07	School	Graduate	0
						Masters	0.007
					Graduate	Masters	0.197
9	Purpose	3.68	3.53	**3.48**	School	Graduate	0.151
						Masters	0.028
					Graduate	Masters	0.675
10	Times missed	4.24	3.98	**3.91**	School	Graduate	0.093
						Masters	0.024
					Graduate	Masters	0.81
11	Miss time	2.16	2.18	**1.99**	School	Graduate	0.945
						Masters	0.071
					Graduate	Masters	0.017
12	Stopped	**1.46**	1.66	1.64	School	Graduate	0.003
						Masters	0.008
					Graduate	Masters	0.943
13	Course Completion	3.06	3.31	**3.37**	School	Graduate	0.133
						Masters	0.042
					Graduate	Masters	0.747

Graduate patients' response for continuing medication even if having a side effect is significantly more than the other two groups. Patients with masters' level of education have missed the medication on purpose, missed the time of medication and missed their medication significantly more times. The job complexity of people belonging to this group is high, which may be why they are less adherent to the timing specification of their medication. Patients with only school education have voluntarily stopped medication more than the other two groups. The survey reveals that patients having master's degree have completed the course of medication (3.37) more than any other group.

Occupation

Table 6 presents a comparison of group means for the significant factors obtained in Table 2 for the different occupation levels of patients. It is evident from the table that the difference in means is mainly for the retired patients concerning the other groups. Homemaker patients forget more than retired patients. That may be because of the busy schedule of their day to day activities that they forget to take their medication. Retired patients forget less, and they run out of their medicines less. They also control their diet and exercise regularly than the other group of patients. Their course completion rates are also higher. All these may be attributed to the fact that they are old and have more time to take care of their health. They are free from their daily job routine and can devote quality time to exercise and medication. The severe nature of medication is also evident, as they understand the severity and importance of medication. Without proper medication, they are vulnerable.

Income

Table 7 represents a comparison of group means for the significant factors obtained in Table 2 for the different patient income levels. The table clearly shows a difference in the opinion of people who have different income levels. On comparing the means of the significant factors, it is found that people having income less than INR 25,000 give more importance to continuing medication for leading an everyday life. That is evident because if they are not fit and fine, they will not work and earn their livelihood. These patients take their medication later after they miss the specific time of their medication. They voluntarily stop their medication and do not complete their medication course compared to the other groups. Patients in the income group of INR 25,000 to INR 50,000 give more importance to continuing medication to fulfil their responsibilities and be self-dependent.

NOVELTY/SIGNIFICANCE OF THE WORK

- A comparative approach for different analytical tools like t-test and ANOVA for addressing medication non-adherence and patient beliefs is new in the study.
- Many variables have been used for the study for adherence, beliefs, importance and side effects.
- Most of the studies focus on adherence and beliefs of patients specific to a disease. A holistic approach towards addressing the problem of patients, in general, is a unique contribution of the study.
- Studies based on clinical trials are under closed and regulated conditions. Patients behave very differently in their natural environment. Hence, this study, which is based on the patients' natural environment, gives a new dimension to adherence and beliefs.

LIMITATIONS

- The study has been conducted only for the patients residing in the state of Sikkim, India.
- Only five demographic factors have been used in the study.

Table 6. Comparison of means based on different occupation levels

Sl. No	Variables	Mean						Occupation		Sig.
		Not working	Homemaker	Private	Government	Self-employed	Retired			
1	Forgot	3.13	**2.59**	3.11	3.13	3.1	3.53	Retired	Not working	0.223
									Homemaker	0.016
									Private	0.181
									Government	0.383
									Self-employed	0.237
2	Ran out	3.42	3.47	3.48	3.71	3.37	**4**	Retired	Not working	0
									Homemaker	0.07
									Private	0
									Government	0.425
									Self-employed	0
3	Control diet	2.6	2.59	2.6	2.92	2.67	**3.47**	Retired	Not working	0
									Homemaker	0.029
									Private	0
									Government	0.163
									Self-employed	0.001
4	Exercise	2.19	2.35	2.44	2.79	2.44	**3.27**	Retired	Not working	0.013
									Homemaker	0.229
									Private	0.077
									Government	0.697
									Self-employed	0.111
5	Course Completion	3.27	3.76	3.15	3.46	3.38	**3.8**	Retired	Not working	0.033
									Homemaker	1
									Private	0.007
									Government	0.648
									Self-employed	0.26

IMPLICATIONS

- The research focuses on the mediating effect of demographic factors on patients' medication adherence and beliefs. It is evident from the research that adherence and beliefs across the demographic characteristics are different. Hence, caregivers and physicians need to focus on patients belonging to different demographic segments differently.
- Reminders are generally designed keeping in mind the type of disease, but a different type of reminder and different approach needs to be adopted for different demographic segments of patients.

Table 7. Comparison of means based on different income levels

Sl. No	Variables	Mean				Income		Sig.
		Less than INR 25,000	INR 25,000 to INR 50,000	INR 50,000 to INR 75,000	More than INR 75,000			
1	Normal life	**8.99**	8.97	8.8	8.13	More than INR 75,000	Less than INR 25,000	0.003
							Rs 25,000 to INR 50,000	0.006
							Rs 50,000 to INR 75,000	0.083
2	Responsibilities	8.24	**8.34**	8.13	7.39	More than INR 75,000	Less than INR 25,000	0.019
							Rs 25,000 to INR 50,000	0.006
							Rs 50,000 to INR 75,000	0.113
3	Self-dependent	8.11	**8.29**	8.16	7.37	More than INR 75,000	Less than INR 25,000	0.056
							Rs 25,000 to INR 50,000	0.011
							Rs 50,000 to INR 75,000	0.087
4	Weight gain	6.11	6.04	**7.13**	6.2	INR 50,000 to INR 75,000	Less than INR 25,000	0.012
							Rs 25,000 to INR 50,000	0.018
							More than 75,000	0.048
5	Later	**2.3**	1.96	1.97	1.98	Less than INR 25,000	Rs 25,000 to INR 50,000	0.002
							Rs 50,000 to INR 75,000	0.006
							More than 75,000	0.01
6	Stopped	**1.51**	1.69	1.71	1.61	Less than INR 25,000	Rs 25,000 to INR 50,000	0.008
							INR 50,000 to INR 75,000	0.007
							More than 75,000	0.335
7	Course Completion	**3.09**	3.32	3.48	3.39	Less than INR 25,000	INR 25,000 to INR 50,000	0.146
							INR 50,000 to INR 75,000	0.003
							More than INR 75,000	0.035

FUTURE RESEARCH DIRECTIONS

- Based on the present study's research limitations, future research can be directed in a similar field for a larger geographical area.
- Larger sample sizes can be used for conducting conclusive studies.
- More demographic factors can be taken up for studies in the future.
- The effect of tailored reminders for addressing adherence based on the demographic factors can be a possibility of research in the future.

CONCLUSION

The research shows that patients' medication adherence and beliefs differ based on their demographic characteristics (Thunander Sundbom & Bingefors, 2012). The importance given to the physician instruction vary mainly based on the gender and dwelling place of the patients. Still, there is no significant difference across income, education and occupation levels of the patients. Retired patients are found to be more adherent than others. Patients falling in the lower-income group are found to be less adherent compared to the other groups. Patients with a lower level of education qualification give more importance to their well-being and fulfil their responsibilities than the other groups. Hence, they feel that medication is essential. It is essential to understand the differences in the pattern of beliefs and adherence based on demographics. That will help design strategies and intervention techniques to address each group differently (Lim & Lim, 2010). Also, it is essential to understand the differences and find what triggers each subgroup to increase adherence or change their beliefs. Only then can effective intervention strategies be developed to improve patient's adherence rate or streamline their beliefs for positive adherence. Intervention techniques aligned with the activities, interests, and lifestyle of the patients can increase adherence rates.

FUNDING

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APPENDIX

Ethical Committee Certificate of Sikkim Manipal Institute of Medical Sciences, Sikkim (Ref: SMIMS/ IEC/2018-064)

URL of Ethical Committee Certificate:
https://smu.edu.in/content/dam/manipal/smu/smit/documents/research/ActiveReminders/Ethical%20 Committee%20Clearence%20Certificate.jpg

URL of Central Referral Hospital, Tadong, Gangtok, Sikkim approval letter for conducting the survey:
https://smu.edu.in/content/dam/manipal/smu/smit/documents/research/ActiveReminders/CRH%20 Approval.jpg

Patient Consent Form:
https://smu.edu.in/content/dam/manipal/smu/smit/documents/research/ActiveReminders/Consent%20 form%20for%20patients.pdf

Saibal Kumar Saha (UGC NET Qualified) holds a first class Master's degree in MBA and a first class Bachelor's Degree in Electronics and Communication Engineering. He has 10+ years of experience and has worked in MNCs like Cognizant Technology Solutions and Tata Aig Life. He has served National Institute of Technology - Silchar, Jyotirmoy School of Business – Kolkata, University of Technology and Management - Shillong and is presently working as Assistant Professor at Sikkim Manipal Institute of Technology - Majitar, India.

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