

Improvement in Medication Adherence Using TV Programmes as Reminders

Saibal Kumar Saha, Sikkim Manipal Institute of Technology, Sikkim Manipal University, India

 <https://orcid.org/0000-0002-7842-698X>

Anindita Adhikary, Sikkim Manipal Institute of Technology, Sikkim Manipal University, India

Ajeaya Jha, Sikkim Manipal Institute of Technology, Sikkim Manipal University, India

 <https://orcid.org/0000-0003-0491-5008>

Vijay Kumar Mehta, Sikkim Manipal Institute of Medical Sciences, Sikkim Manipal University, India

ABSTRACT

According to WHO, only 50% of patients adhere to chronic therapy. The problem of non-adherence has persisted over decades. Over 197 million Indian households have TV sets, and on average Indians spend 3 hours, 44 minutes watching television. A TV programme is used as intervention by patients to improve medication adherence rates. The objective of the research is to find the effect of TV programmes as a form of reminder in improving medication adherence. With the help of a structured questionnaire, the information about medication adherence behaviour was obtained from patients suffering from different types of diseases in the state of Sikkim, India. It has been found that when patients use TV programmes as a form of reminder, the odds of missing the medication consciously reduces by 45.9%. At a personal level, the probability that a person will not miss the time of medication is 42.3% higher compared to when it is not used, and if the total population is considered, 15.6% fewer people would not be missing the medication at all when the reminder is used.

KEYWORDS

Adherence, Medication Medication Regime, Odds Ratios, Patient Beliefs, Relative Risk, Reminder, Risk Difference, Sikkim, TV Programme

INTRODUCTION

Medication adherence is defined as “the degree to which a person’s behaviour corresponds to the recommendations made by a health care provider” (Sabaté et al., 2003). WHO has reported that only 50% of people adhere to their chronic therapy (WHO | ADHERENCE TO LONG-TERM THERAPIES: EVIDENCE FOR ACTION, 2015). Medication non-adherence is associated with increased health risks and treatment costs (Gu et al., 2020). As of 2018 4.3% of hospital admissions in Asia, Europe, Australia and North America were due to non-adherence (Mongkhon et al., 2018). Demographic characteristics and social factors (Liddelow et al., 2020) have been associated with medication adherence. Males have been reported to be more adherent than females (Chen et al., 2014; Manteuffel

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et al., 2014). The study conducted in Taiwan associates low causative ascription to culture, lesser symptoms and more ascription to risk factors for males and more causative ascription to balance and risk factors, illness coherence and less personal control for females (Chen et al., 2014). One study reports this number to be 4% (Eindhoven et al., 2018). Self-reporting (Al-Ganmi et al., 2020), pill count (Saber et al., 2020) and direct observation (Hawkshead & Krousel-Wood, 2007) are some of the techniques used to measure adherence. With the analytic method of ratios, effect of interventions on diseases (Foroutan et al., 2020; Hu et al., 2020; Mecro et al., 2019) has been studied. In this study, with the help of probability and ratio analysis the effect of TV programme as a form of reminder in addressing the barriers of medication adherence has been studied.

LITERATURE REVIEW

Treatment of chronic diseases require long-term therapies. Medication non-adherence is a hurdle for obtaining the desired results in such treatment processes (Alhazami et al., 2020). Non-adherence is a complex set of behaviours which may be due to intentional or unintentional causes (Chan et al., 2020). Patient's inability to adhere due to lack of resources is called unintentional non-adherence. When patient decides not to follow the regime, it is called intentional non-adherence. Patients may resort to non-adherent behaviour at any stage of the medication process (Hatah et al., 2020).

Studies report that medication non-adherence is a worldwide phenomenon (Hatah et al., 2020). In developed countries non-adherence is reported to be 50% (Institute, 2009). It is estimated that in United States the rate of non-adherence for chronic patients range between 30% to 50% while for developing countries like Gambia and China the rates are 73% and 54% respectively (Sabaté et al., 2001). Studies conducted in Malaysia reported adherence rate to be 53% (Sufiza Ahmad et al., 2013) and 53.4% (Ramli et al., 2012) among patients suffering from diabetes and hypertension. Studies conducted in Europe reported non-adherence to be 60.24% for antiosteoporotics, 55.63% for antihyperlipidemics and 46.80% for oral antidiabetics (Menditto et al., 2018).

WHO has classified the causes of non-adherence as "socioeconomic factors, health care and system-related factors, therapy-related factors, condition-related factors and patient-related factors" (Putignano et al., 2017). Medication non-adherence is often related with failure on the part of patient to comply with the medication regime as prescribed by physician, but other factors like access to healthcare facilities, instructions related to drug administration, patient physician relationship, side effects, severity of the disease, dose complexity, beliefs, forgetfulness, adverse events and communication (Kardas et al., 2013) (Scala et al., 2016). Studies suggest that medication non-adherence is affected by multiple factors and these factors are related to each other (Menditto et al., 2020). Several interventions have been designed to address the problem of medication non-adherence, which have shown varying degree of success rates.

Side effect of many types of medicine causes itching (Okumus et al., 2020) and formation of rashes in the skin (Aruta et al., 2020). These have been associated with medication non-adherence (Carpenter et al., 2020). Studies have reported taking medicine later 4.8% (Ma et al., 2019) is associated with medication non adherence (Garaix et al., 2018). While many patients consciously miss their medication (Sharkness & Snow, 1992; Webb et al., 2001). Running out of medicine (Hill-Briggs et al., 2005) has been reported in many studies as a form of medication non-adherence: 13.4% (Tsega et al., 2015), 35% (Martin et al., 2010). A study on chronic obstructive pulmonary disease and asthma patients reports stop/miss medication was largely when patients felt better (64.81%) (Fugate et al., n.d.). Taking medication as per the time prescribed (Harris et al., 2019) by physician is crucial for recovery of patient. Studies report that activities like eating breakfast (Wagner & Ryan, 2004), watching TV Programme (Sorensen et al., 1998) which are structured and routinized are important predictors of medication adherence. India, with a population 1.37 billion (Ghosh, 2020) people has 298 million households, of which 197 has a TV set (*Number of Homes with TV Sets Grows by 7.5%*

to 197 Million, Says BARC - *The Financial Express*, n.d.). It is reported that Indians on an average spend 3 hours, 44 minutes watching television (*Indians Are Watching TV for 3 Hour 44 Minutes Every Day: BARC India - The Economic Times*, n.d.). Hence, TV programme as intervention is often used by people to adhere to medication regime (Heylen et al., 2020).

METHODOLOGY

By clustered sampling technique, 509 patients suffering from different types of diseases in Sikkim, India were interviewed and asked whether they agree to the following factors or not (Yes or No).

1. Continuing medication is important even if it leads to formation of rashes in the skin or causes itching.
2. Taking medicine later even after missing it.
3. Running out of medicine.
4. Missing the medication consciously.
5. Not missing the medication at all.
6. Not missing the time of medication.

The respondents were asked (Yes or No) whether TV programme was used by them as a form of reminder to take medication. The responses were tabulated as shown in Table 1.

In Table 1, w, x, y and z are number of responses.

The probability of positive response of the factor when TV programme is used as reminder is calculated as:

$$\hat{p}_{TV\ Programme} = \frac{w}{(w + x)}$$

The probability of positive response of the factor when reminder is not used is calculated as:

$$\hat{p}_{no\ reminder} = \frac{y}{(y + z)}$$

The other formulae used are as follows (Hancock & Kent, 2016):

1. Risk Difference: $\widehat{RD} = \hat{p}_{TV\ Programme} - \hat{p}_{no\ reminder}$:
 - a. Standard error:

Table 1. Response tabulation format

	TV Programme used as reminder	Reminder not used
Positive response of the factor	w	y
Negative response of the factor	x	z
Total	w + x	y + z

$$\widehat{SE}\left(\widehat{p}_{TV\ Programme} - \widehat{p}_{no\ reminder}\right) = \sqrt{\frac{\left(\widehat{p}_{TV\ Programme}\right)\left(1 - \widehat{p}_{TV\ Programme}\right)}{(w+x)} + \frac{\left(\widehat{p}_{no\ reminder}\right)\left(1 - \widehat{p}_{no\ reminder}\right)}{(y+z)}}$$

b. 95% confidence interval (CI):

$$\left(\widehat{p}_{TV\ Programme} - \widehat{p}_{no\ reminder}\right) \pm 2\widehat{SE}\left(\widehat{p}_{TV\ Programme} - \widehat{p}_{no\ reminder}\right)$$

2. Relative Risk: $\widehat{RR} = \frac{\widehat{p}_{TV\ Programme}}{\widehat{p}_{no\ reminder}}$:

- a. Log of $\widehat{RR}$ is calculated as $\ln(\widehat{RR})$;
- b. Standard error:

$$\widehat{SE}\left(\ln(\widehat{RR})\right) = \sqrt{\frac{1}{w} - \frac{1}{(w+y)} + \frac{1}{x} - \frac{1}{(x+z)}}$$

c. 95% confidence interval (CI): $\ln(\widehat{RR}) \pm 2\widehat{SE}\left(\ln(\widehat{RR})\right)$, then anti-log of the values were taken;

3. Odds Ratio:

$$\widehat{OR} = \frac{\frac{\widehat{p}_{TV\ Programme}}{\left(1 - \widehat{p}_{TV\ Programme}\right)}}{\frac{\widehat{p}_{no\ reminder}}{\left(1 - \widehat{p}_{no\ reminder}\right)}}$$

- a. Log of $\widehat{OR}$ is calculated as $\ln(\widehat{OR})$;
- b. Standard error:

$$\widehat{SE}\left(\ln(\widehat{OR})\right) = \sqrt{\frac{1}{w} + \frac{1}{x} + \frac{1}{y} + \frac{1}{z}}$$

c. 95% confidence interval (CI): $\ln(\widehat{OR}) \pm 2\widehat{SE}\left(\ln(\widehat{OR})\right)$, then anti-log of the values were taken.

Since both the values at 95% confidence interval has the same sign (+ or -) it can be said that results were due to use of TV Programme as reminder and not by chance.

ANALYSIS AND DISCUSSION

Responses obtained were analysed and their implications are discussed as follows.

Continuing medication is important even if it leads to formation of rashes in the skin or causes itching.

$\widehat{RD} = 18.3\%$ means that when TV programme is used as a reminder there is 18.3% absolute probability of increase in “continuing medication even if it leads to formation of rashes in the skin or causes itching” compared to when it is not used. CI 95% (9.6%, 27.0%) means that after accounting for “sampling variability” the effect of TV programme as reminder on “continuing medication even if it leads to formation of rashes in the skin or causes itching” could increase between 9.6% to 27.0%.

$\widehat{RR} = 50.5\%$ means that when a person uses TV programme a form of reminder he will “continue medication even if it leads to formation of rashes in the skin or causes itching” is 50.5% higher compared to when it is not used. CI 95% (23.0%, 84.2%) means that the assessments in probability may increase by as low as 23.0% to as high as 84.2%. $\widehat{OR} = 111.0\%$ means that people who uses TV programme as a form of reminder has 111.0% greater odds of “continuing medication even if it leads to formation of rashes in the skin or causes itching” compared to when they do not use. CI 95% (46.8%, 203.2%) means that the assessments in probability odds may increase by as low as 46.8% to as high as 203.2%.

TAKING MEDICINE LATER EVEN AFTER MISSING IT

$\widehat{RD} = 9.1\%$ means that when TV programme is used as a reminder there is 9.1% absolute probability of increase in “taking medicine later even after missing it” compared to when it is not used. CI 95% (0.8%, 17.4%) means that after accounting for “sampling variability” the effect of TV programme as reminder on “taking medicine later even after missing it” could increase between 0.8% to 17.4%.

$\widehat{RR} = 51.0\%$ means when a person uses TV programme a form of reminder he will “take medicine later even after missing it” is 51.0% higher compared to when it is not. CI 95% (6.1%, 114.9%) means that the assessments in probability may increase by as low as 6.1% to as high as 114.9%. $\widehat{OR} = 69.7\%$ means that people who uses TV programme as a form of reminder has 69.7% greater odds of

Table 2. $\widehat{RD}$, $\widehat{RR}$, $\widehat{OR}$ or rashes in the skin or causing itching

Parameter	Parameter %	CI 95%	
		Parameter – 2 $\widehat{SE}$	Parameter + 2 $\widehat{SE}$
$\widehat{RD}$	18.3%	9.6%	27.0%
$\widehat{RR}$	50.5%	23.0%	84.2%
$\widehat{OR}$	111.0%	46.8%	203.2%

Table 3. $\widehat{RD}$, $\widehat{RR}$, $\widehat{OR}$ making medication later

Parameter	Parameter %	CI 95%	
		Parameter - 2 $\widehat{SE}$	Parameter + 2 $\widehat{SE}$
$\widehat{RD}$	9.1%	0.8%	17.4%
$\widehat{RR}$	51.0%	6.1%	114.9%
$\widehat{OR}$	69.7%	7.0%	169.2%

“taking medicine later even after missing it” compared to when they do not. CI 95% (7.0%, 169.2%) means that the assessments in probability odds may increase by as low as 7.0% to as high as 169.2%.

RUNNING OUT OF MEDICINE

$\widehat{RD} = -12.0\%$ means that when TV programme is used as a reminder there is 12.0% absolute probability of decrease in “running out of medicine” compared to when it is not used. CI 95% (-20.7%, -3.3%) means that after accounting for “sampling variability” the effect of TV programme as reminder on “running out of medicine” could decrease between 20.7% to 3.3%. $\widehat{RR} = 19.1\%$ means when a person uses TV programme a form of reminder he will “run out of medicine” is 19.1% lower compared to when it is not used. CI 95% (30.8%, 5.4%) means that the assessments in probability may decrease by as low as 5.4% to as high as 30.8%. $\widehat{OR} = 38.9\%$ means that people who uses TV programme as a form of reminder has 38.9% lower odds of “running out of medicine” compared to when they do not. CI 95% (57.4%, 12.3%) means that the assessments in probability odds may decrease by as low as 12.3% to as high as 57.4%.

Table 4. $\widehat{RD}$, $\widehat{RR}$, $\widehat{OR}$ or running out of medicine

Parameter	Parameter %	CI 95%	
		Parameter - 2 $\widehat{SE}$	Parameter + 2 $\widehat{SE}$
$\widehat{RD}$	-12.0%	-20.7%	-3.3%
$\widehat{RR}$	19.1%	30.8%	5.4%
$\widehat{OR}$	38.9%	57.4%	12.3%

MISSING THE MEDICATION CONSCIOUSLY

$\widehat{RD} = -14.4\%$ means that when TV programme is used as a reminder there is 14.4% absolute probability of decrease in “missing the medication consciously” compared to when it is not. CI 95% (-22.9%, -5.9%) means that after accounting for “sampling variability” the effect of TV programme as reminder on “missing the medication consciously” could decrease between 22.9% to 5.9%. $\widehat{RR} = 20.9\%$ means when a person uses TV programme a form of reminder he will “miss the medication consciously” is 20.9% lower compared to when it is not used. CI 95% (31.4%, 8.8%) means that the assessments in probability may decrease by as low as 8.8% to as high as 31.4%. $\widehat{OR} = 45.9\%$ means that people who uses TV programme as a form of reminder has 45.9% lower odds of “missing the medication consciously” compared to when they do not. CI 95% (62.6%, 21.7%) means that the assessments in probability odds may decrease by as low as 21.7% to as high as 62.6%.

NOT MISSING THE MEDICATION AT ALL

$\widehat{RD} = -15.6\%$ means that when TV programme is used as a reminder there is 15.6% absolute probability of decrease in “not missing the medication at all” compared to when it is not. CI 95% (-23.7%, -7.5%) means that after accounting for “sampling variability” the effect of TV programme as reminder on “not missing the medication at all” could decrease between 23.7% to 7.5%. $\widehat{RR} = 20.3\%$ means when a person uses TV programme a form of reminder he will “not miss the medication at all” is 20.3% lower compared to when it is not used. CI 95% (29.4%, 10.0%) means that the estimates in probability may decrease by as low as 10.0% to as high as 29.4%. $\widehat{OR} = 52.3\%$ means that people who uses TV programme as a form of reminder has 52.3% lower odds of “not missing the medication at all” compared to when they do not. CI 95% (67.8%, 29.4%) means that the assessments in probability odds may decrease by as low as 29.4% to as high as 67.8%.

NOT MISSING THE TIME OF MEDICATION

$\widehat{RD} = 10.6\%$ means that when TV programme is used as a reminder there is 10.6% absolute probability of increase in “not missing the time of medication” compared to when it is not used. CI 95% (1.5%, 19.6%) means that after accounting for “sampling variability” the effect of TV programme as reminder on “not missing the time of medication” could increase between 1.5% to 19.6%. $\widehat{RR} = 42.3\%$ means when a person uses TV programme a form of reminder he will “not miss the time of medication” is

Table 5. $\widehat{RD}$, $\widehat{RR}$, $\widehat{OR}$ or missing the medication consciously

Parameter	Parameter %	CI 95%	
		Parameter - 2 $\widehat{SE}$	Parameter + 2 $\widehat{SE}$
$\widehat{RD}$	-14.4%	-22.9%	-5.9%
$\widehat{RR}$	20.9%	31.4%	8.8%
$\widehat{OR}$	45.9%	62.6%	21.7%

Table 6. $\widehat{RD}$, $\widehat{RR}$, $\widehat{OR}$ or not missing the medication at all

Parameter	Parameter %	CI 95%	
		Parameter - 2 $\widehat{SE}$	Parameter + 2 $\widehat{SE}$
$\widehat{RD}$	-15.6%	-23.7%	-7.5%
$\widehat{RR}$	20.3%	29.4%	10.0%
$\widehat{OR}$	52.3%	67.8%	29.4%

42.3% higher compared to when it is not used. CI 95% (6.9%, 89.4%) means that the assessments in probability may increase by as low as 6.9% to as high as 89.4%. $\widehat{OR} = 65.6\%$ means that people who uses TV programme as a form of reminder has 65.6% greater odds of “not missing the time of medication” compared to when they do not. CI 95% (8.8%, 152.1%) means that the assessments in probability odds may increase by as low as 8.8% to as high as 152.1%.

CONCLUSION

The $\widehat{RD}$ may not appear to be very high, but when the population numbers are used the number of people affected by it are significantly large. $\widehat{RD} = 18.3\%$ implies that for every 1000 people, 183 more people would be “continuing medication even if it leads to formation of rashes in the skin or causes itching” when TV programme is used as reminder. This number could be as low as 96 to as large as 270. $\widehat{RD} = 9.1\%$ implies that for every 1000 people, 91 more people would be “taking medicine later even after missing it” when TV programme is used as reminder. This number could be as low as 8 to as large as 174. $\widehat{RD} = -12.0\%$ implies that for every 1000 people, 120 less people would be “running out of medicine” when TV programme is used as reminder. This number could be as low as 33 to as large as 207. $\widehat{RD} = -14.4\%$ implies that for every 1000 people, 144 less people would be “missing the medication consciously” when TV programme is used as reminder. This number could be as low as 59 to as large as 229. $\widehat{RD} = -15.6\%$ implies that for every 1000 people,

Table 7. $\widehat{RD}$, $\widehat{RR}$, $\widehat{OR}$ or not missing the time of medication

Parameter	Parameter %	CI 95%	
		Parameter - 2 $\widehat{SE}$	Parameter + 2 $\widehat{SE}$
$\widehat{RD}$	10.6%	1.5%	19.6%
$\widehat{RR}$	42.3%	6.9%	89.4%
$\widehat{OR}$	65.6%	8.8%	152.1%

156 less people would not be “missing the medication at all” when TV programme is used as reminder. This number could be as low as 75 to as large as 237. $\widehat{RD} = 10.6\%$ implies that for every 1000 people, 106 more people would “not be missing the time of medication” when TV programme is used as reminder. This number could be as low as 15 to as large as 196.

TV, being a very common item in almost every household in Sikkim and patients who spend considerable amount of time watching different types of programmes may use a particular programme’s commencement or ending time to take the prescribed medication. It can act as a reminder and help to increase adherence. Studies have found that odds of adherence increase by 3% (Ramli et al., 2012) with increase in age, with increase in adherence there is decrease in hospitalization by 33% (Kim et al., 2016) and odds reduce by 15% (Lage & Hassan, 2009).

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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 8+ 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.

Anindita Adhikary is currently a Professor in Management, Sikkim Manipal University, India. A commerce graduate from Gauhati University, India, she happens to be an MBA from Tezpur Central University, India and was awarded Doctorate by Gauhati University in 2009. Dr. Adhikary has 20 years of professional experience in academics and corporate sector. She has 65+ research publications (select papers in Scopus) to her credit and has been abroad a number of times in order to have an enriched exposure at international level. Dr. Adhikary had participated in 25 professional workshops and delivered talks as Guest Speaker at different Orientation Programmes initiated through National Productivity Council, MSME, Govt. of India and Department of Commerce. Govt. of Sikkim. Her domain of interest includes Finance and International Trade.

Vijay Kumar Mehta, MBBS, MD, PGDCA, is currently working as the Dean of Sikkim Manipal Institute of Medical Sciences. After retiring from Indian Armed Forces as Brigadier on 30th Sept. 2013 joined Sikkim Manipal Institute of Medical Sciences, Gangtok on 21st Oct. 2013 as Professor in the department of Community Medicine. Subsequently, took over as Professor and Head department of Community Medicine at Sikkim Manipal Institute of Medical Sciences, Gangtok on 1st Feb. 2014. Have more than 22 years of teaching experiences including twelve and half years as Professor and 5 years as Professor and HOD Community Medicine in SMIMS, Gangtok.