

A Pre-Experimental Study to Assess the Effectiveness of QR Code Information on Knowledge Regarding Over-The-Counter Drugs Among Adults in Selected Areas of Pune City

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ABSTRACT

Over-the-counter (OTC) medicines are commonly used for self-treatment of minor ailments due to their easy availability, affordability, and convenience. Although OTC drugs reduce the burden on healthcare services, their inappropriate use can lead to adverse drug reactions, incorrect dosing, masking of serious illnesses, and antimicrobial resistance. In India, self-medication is highly prevalent, especially among urban populations, indicating a lack of adequate awareness regarding safe OTC drug use. Innovative educational strategies such as QR code-based information can provide accessible, cost-effective, and user-friendly health education.

Methods: A quantitative research approach with a pre-experimental one-group pre-test and post-test design was used. The study was conducted among 60 adults residing in selected areas of Pune city, selected using a non-probability purposive sampling technique. QR code-based information was the independent variable, and knowledge regarding OTC drugs was the dependent variable. Data were collected using a structured questionnaire. Adults who could use smartphones and read Marathi or English were included.

Result In the pre-test, 30% had poor knowledge, 60% had average knowledge, and 10% had good knowledge. Post-test results showed 95% had good knowledge and none had poor knowledge. The mean post-test score (13.5) was significantly higher than the pre-test mean (6.9), with a paired t-test value of 18.54 ($p < 0.0001$). Significant associations were found with age, education, and previous knowledge, while gender and marital status showed no association.

Conclusion The study concluded that QR code-based information was highly effective in improving knowledge regarding OTC drugs among adults.

Keywords: QR code information, Over-the-counter drugs, Knowledge, Educational intervention.

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INTRODUCTION

Over-the-counter (OTC) medicines play a significant role in the management of minor health problems such as headache, fever, cough, cold, acidity, and minor pain. Their easy availability without prescription, affordability, and convenience have contributed to their widespread use across all sections of society. OTC medicines help reduce the burden on healthcare facilities and allow individuals to manage simple ailments independently. However, despite these advantages, inappropriate and irrational use of OTC drugs has become a growing public health concern [1].

Improper use of OTC medicines can lead to several adverse outcomes, including incorrect dosing, drug interactions, allergic reactions, and prolonged or worsening illness. Self-medication may also mask the symptoms of serious underlying diseases, delaying timely diagnosis and appropriate treatment. In addition, misuse of certain drugs such as analgesics, antacids, and antimicrobials can contribute to complications like organ damage and antimicrobial resistance. Lack of adequate

knowledge regarding indications, dosage, duration of use, and potential side effects is a major factor contributing to unsafe OTC drug practices [2].

In India, self-medication with OTC drugs is highly prevalent due to easy access to pharmacies, limited regulatory enforcement, and increasing health-related information from informal sources such as friends, family, and the internet. Urban populations and younger adults, in particular, frequently rely on OTC medicines without professional guidance. This highlights a critical gap in public awareness and the need for effective educational interventions to promote safe and responsible use of OTC medications [3].

With the increasing use of digital technology, innovative and accessible educational strategies are essential to improve health literacy. QR code-based educational interventions offer a simple, cost-effective, and user-friendly method to deliver accurate health information directly to the public. By providing instant access to reliable educational content, QR codes have the potential to enhance knowledge and encourage safe medication practices.

Therefore, this study aims to assess the effectiveness of a QR code-based educational intervention in improving knowledge regarding the safe use of over-the-counter drugs [4].

NEED OF THE STUDY

In India, the use of over-the-counter (OTC) medicines without professional consultation has become increasingly common for managing minor ailments such as fever, cough, cold, and digestive discomfort. While this practice is often viewed as convenient and cost-effective, unsupervised use of OTC medicines can result in incorrect dosing, adverse drug reactions, harmful drug interactions, masking of serious illnesses, and delayed medical consultation. These risks emphasize the need to improve public awareness regarding the safe and rational use of OTC medicines [5].

Evidence from national and regional studies indicates a high prevalence of self-medication, particularly among young adults and urban populations [6]. Many individuals mistakenly believe that OTC medicines are completely safe due to their non-prescription status, leading to irrational drug use and unsafe health practices. A study by Pareek et al. (2019) on self-medication practices among healthcare students in India found that the majority of respondents lacked adequate knowledge regarding dosage, contraindications, and the duration of OTC drug use, highlighting significant knowledge gaps that persist across educated populations [6]. Knowledge deficits related to dosage, duration of use, contraindications, and warning signs remain significant barriers to safe self-medication practices.

Urban areas like Pune show high smartphone penetration and digital literacy, providing an opportunity to adopt innovative health education strategies. Research has demonstrated that technology-based interventions, especially QR code-based educational materials, are effective in improving knowledge retention and promoting positive health behaviours [7]. QR code-linked information offers easy access, sustained engagement, and timely learning. Abraham and Biswal (2024) demonstrated that educational interventions using simple media tools significantly improved OTC drug knowledge among adults, underscoring the need for such strategies in community settings [7].

Therefore, this study is needed to assess the effectiveness of QR code-based information in improving knowledge regarding OTC medicines and to promote their safe and responsible use among adults in Pune city [8].

AIM OF THE STUDY

To assess the effectiveness of QR code-based educational information on knowledge regarding

over-the-counter drugs among adults in selected areas of Pune city.

RESEARCH METHODOLOGY

Research Objectives:

1. To assess the knowledge level of adults regarding over-the-counter drugs before the intervention.
2. To assess the knowledge level of adults regarding over-the-counter drugs after the intervention.
3. To assess the effectiveness of QR code-based intervention on knowledge regarding over-the-counter drugs among adults.
4. To associate the findings of pre-interventional knowledge scores with selected demographic variables.

Research Type:

This study used a quantitative research approach, which means data was collected in numerical form to measure knowledge regarding OTC drugs and the effectiveness of the QR code-based intervention.

Research Design:

A pre-experimental one-group pre-test and post-test design was used to assess the change in knowledge levels before and after exposure to the QR code-based educational intervention among the same group of participants.

Sample:

The sample consisted of 60 adults residing in selected areas of Pune city, Maharashtra, India.

Sample Size:

The sample size was 60 participants.

Sampling Technique:-

A non-probability purposive sampling technique was used. Inclusion criteria required adults who could use a smartphone, understand the use of QR codes, and read Marathi or English. Children and geriatric individuals were excluded from the study.

Tool Description:

Description Of Tool

A structured knowledge questionnaire was used, comprising items related to OTC drug indications, dosage, side effects, contraindications, and risks of misuse. QR code-based information was the independent variable, and knowledge regarding OTC drugs among adults was the dependent variable. Content validity of the tool was established through expert review.

Reliability:-

Reliability was assessed using the test-retest method, yielding an acceptable reliability coefficient.

Pilot Study:-

A pilot study was conducted among 6 participants to assess feasibility. The findings confirmed that the study was feasible with no major difficulties.

The data collected were analyzed using descriptive and inferential statistics, including mean, standard

deviation, and a paired t-test, to evaluate the effectiveness of the intervention and its association with selected demographic variables.

RESULTS:

Section 1: Demographic Profile of Study Participants

Table 1: Demographic data (n=60)

S.No	Variable	Frequency	Percentage
1	Age (years)		
	18–28 yrs	14	23.33%
	29–38 yrs	14	23.33%
	39–48 yrs	21	35.00%
	49 yrs and above	11	18.33%
	Total	60	100%
2	Gender		
	Male	31	51.66%
	Female	29	48.33%
	Other	0	0.00%
	Total	60	100%
3	Educational Level		
	School	7	11.66%
	College (Undergraduate)	22	36.66%
	Graduate & above	23	38.33%
	Any other	8	13.33%
	Total	60	100%
4	Occupation		
	Student	15	25.00%
	Private job	26	43.33%
	Government job	9	15.00%
	Self employed	10	16.66%
	Total	60	100%
5	Frequent smartphone use		
	Yes	56	93.33%
	No	4	6.66%
	Total	60	100%

S.No	Variable	Frequency	Percentage
6	Previously scanned a QR code for health information		
	Yes	22	36.67%
	No	38	63.33%
	Total	60	100%
7	QR code perceived as easy to use for health information*		
	Yes	23	38.33%
	No	37	61.66%
	Total	60	100%

**Note: This item was intended as a follow-up question for the 22 participants who answered "Yes" to the preceding item; however, the reported frequencies total 60. Authors should verify the base denominator for this item.*

Interpretation:

Table 1 depicts the demographic profile of the 60 study participants. The majority (35.00%) were in the age group of 39–48 years, followed by equal proportions (23.33% each) in the 18–28 and 29–38 age groups. Regarding gender, 51.66% were male and 48.33% were female. In terms of education, 38.33% were graduates or above and 36.66% were undergraduates. A large proportion (93.33%) used smartphones frequently, while only 22 participants (36.67%) had previously scanned a QR code for health information, indicating scope for digital health education.

Section 2: Comparison of Pre-Test and Post-Test Knowledge Scores

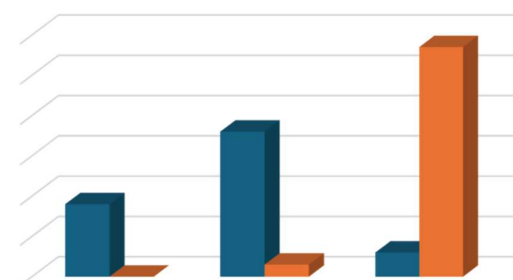


Figure 1: Bar graph showing comparison between pre-test and post-test knowledge scores among adults regarding OTC drugs (n=60)

Figure 1 illustrates the comparison between pre-test and post-test knowledge scores regarding OTC drugs. In the pre-test, 30% of participants had poor knowledge, 60% had average knowledge, and only

10% had good knowledge. After the QR code-based intervention, a marked improvement was observed: 95% of participants achieved good knowledge and none remained in the poor knowledge category. This graphical representation clearly demonstrates the significant positive impact of the QR code-based educational intervention on participants' knowledge levels.

Table 2: Comparison of pre-test and post-test knowledge scores using paired t-test (n=60)

Knowledge	Mean	SD	N
Pre-test	6.9	2.5	60
Post-test	13.5	1.5	60

Paired t-test = 18.54, df = 59, p < 0.0001 (Significant)

Interpretation:

Table 2 presents the comparison between pre-test and post-test mean knowledge scores. The mean pre-test score was 6.9 (SD = 2.5), which significantly improved to 13.5 (SD = 1.5) in the post-test. The paired t-test value was 18.54 (df = 59, p < 0.0001), which is statistically highly significant. These findings confirm that the QR code-based educational intervention was effective in improving knowledge regarding OTC drugs among the study participants.

DISCUSSION:

This study assessed the effectiveness of QR code-based educational information on knowledge regarding over-the-counter (OTC) drugs among 60 adults in selected areas of Pune city. A pre-experimental one-group pre-test and post-test design was employed. Participants accessed QR code-linked educational content through their smartphones, and knowledge was measured before and after the intervention using a structured questionnaire.

Pre-test findings revealed that 30% of participants had poor knowledge and 60% had average knowledge. Post-intervention, 95% attained good knowledge (mean score improved from 6.9 to 13.5; t = 18.54, p < 0.0001). These results align with Abraham and Biswal (2024), whose pamphlet-based educational intervention among adults in Chhattisgarh produced similarly significant improvements in OTC drug knowledge [7]. The magnitude of improvement observed in both studies confirms the effectiveness of targeted educational materials in community settings.

Similarly, Jayalakshmi and Kalaimathi (2020) found that an IEC package significantly improved knowledge and attitude regarding OTC drugs among adults, further validating the value of structured health education [8]. The present study also found significant associations between knowledge scores and age, educational background, and prior

exposure to health information. This is corroborated by Subramanian et al. (2018), who reported educational level as a strong predictor of OTC drug knowledge [9]. No significant association was observed with gender or marital status, consistent with Hyder and Rajan (2023) [10].

Overall, the QR code-based approach proved to be a practical, scalable, and cost-effective digital health education strategy. Its success in an urban population with high smartphone penetration suggests strong potential for wider adoption in community health programs targeting safe OTC drug use.

CONCLUSION

The present study concludes that QR code-based educational information was highly effective in significantly improving knowledge regarding the safe use of over-the-counter (OTC) drugs among the study participants. Before the intervention, participants demonstrated limited awareness related to appropriate drug selection, dosage, indications, precautions, and potential adverse effects of OTC medications. Following the administration of QR code-enabled educational content, a marked improvement in post-test knowledge scores was observed, indicating that digital learning tools can play a vital role in enhancing medication-related awareness.

The findings highlight that QR code-based education is a simple, accessible, cost-effective, and innovative approach that allows participants to obtain accurate health information at their convenience. This method encourages self-learning, improves retention of knowledge, and promotes responsible self-medication practices. The study further emphasizes the importance of structured educational interventions in reducing the risks associated with inappropriate OTC drug use, such as incorrect dosing and adverse drug reactions. Overall, the results suggest that QR code-based educational interventions can be effectively integrated into community health education programs to improve public knowledge and ensure safer use of over-the-counter medications.

CONFLICT OF INTEREST

The authors declare that they have no financial or non-financial conflict of interest related to the subject matter discussed in this paper.

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