Original Research Article

A cross-sectional e-survey to map clinical practice of electrocardiogram use as a screening tool in outpatient department: India office electrocardiogram e-survey

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ABSTRACT

Background: Early detection of electrocardiogram (ECG) abnormalities in high risk cardiovascular patients with routine ECG screening is the need of the hour. The aim of the e-survey was to understand the use of ECG in high risk cardio-metabolically deranged patients at outpatient departments (OPDs) by Indian physicians.
Methods: A cross-sectional India office ECG (IOECG) e-survey was conducted using Google form questionnaire from November 2021 to December 2021 among Indian physicians. Survey results were collected and analysed using Google form survey tool.
Results: We received total of 1863 responses. The results of the survey showed that while 90% of physicians agreed to the necessity of doing 12 lead ECG of cardio-metabolically deranged patients, only 61% of all physicians could perform ECG screening in less than 40% of high risk cardio-metabolic patients mainly, due to several practical challenges. Among physicians, 40.2% physicians believed that 12 lead ECG was too time consuming, 35.8% physicians believed that the unavailability of ECG device was common reason while 27.5% physicians believed that there was a lack of trained staff. Majority of physicians (69.7%) agreed to use point of care ECG device which can be a solution for more screening of such patients whether symptomatic or asymptomatic. According to the survey, 88.7% physicians would appreciate if a portable handheld ECG device was made available to facilitate screening in their practice.
Conclusions: There is a need of the portable handheld ECG device which helps physicians to screen large number of cardio-metabolically deranged patients in their busy OPDs.

Keywords: Arrhythmias, ECG abnormalities, Portable handheld ECG, Screening

INTRODUCTION

Cardiovascular disease (CVD) remains the leading cause of death and premature death worldwide, despite advances in the availability of effective and safe prevention strategies around the world. Of the 18.6 million CVD deaths globally in 2019, 58% have been in Asia.[1] India is a rapidly developing country; this has led to a rapid change from reduction in communicable diseases to an increase in non-communicable diseases. In India, CVDs have become the major cause of mortality. When we compare the population in India with that in Europeans, the CVD affects 10 years earlier.[2,3] For example, before the age of 70 years 52% deaths occur in India as compared to only

23% in Western populations.[2] Traditional risk factors which are responsible for such high CVD epidemic in India include dietary factors, smoking, obesity, diabetes, hypertension, aging population, sedentary lifestyle, family history of CVD.[1] The patients at high CV risk include at least 3 risk factors mentioned above.[4,5] Results from the Global burden of disease study showed an age-standardized CVD death rate of 272 per 100,000 population in India, which is well above the global average of 235.[3]

Majority of patients have no symptoms until a first major cardiovascular event such as sudden cardiac arrest, myocardial infarction or arrhythmia. A major contributing factor appears to be the inability to detect these cardiac disorders until the end of their natural history, thus missing therapeutic window where maximum benefit could be offered with early intervention. Assessment of aforementioned traditional risk factors may help to predict CV disease, but cannot detect who is at the risk, for instance in the elderly population, the prediction of coronary heart disease (CHD) by traditional risk factors is less accurate than in middle-aged adults.[6,7] Considering the silent progression of cardiovascular disease, early diagnosis and treatment is critical.[8]

Besides biochemical and physiological factors, ECG should be carried out not only in the cases of a fatal danger (e.g. cardiac chest pain) but also in the cases of asymptomatic high-risk patients with or without cardiovascular or coronary disease.[9] Screening proactively with ECG may reveal unrecognized ECG abnormalities in large number of patients. Early detection of ECG abnormalities is necessary in patients with high risk CVD and in patients without overt disease before occurrence of serious and irreversible damage.[10,11] Systematic global CVD risk assessment, including ECG is recommended in individuals with any major vascular risk factor (family history of premature CVD, familial hypercholesterolemia, CVD risk factors such as smoking, arterial hypertension, DM, raised lipid level, obesity or comorbidities increasing CVD risk (2021 ESC guideline, recommendation I-C).[12] As per prospective registry study done at UK, a high prevalence of ECG abnormalities (31.8%) was present from the selected population (n=4739). Thus, ECG gives the capacity to become aware of those abnormalities and offers in advance intervention and treatment and in all likelihood improve cardiovascular outcome.[6,9]

The 12-lead ECG remains the gold standard, however, it can be difficult to perform for a variety of reasons including dedicated and trained staff, a private clinic environment, time required, cleaning and setting up network of cables (4 limb electrodes and 6 pericardial electrodes) and busy OPD.[13] Thus, there was a need for an ECG device with good sensitivity and specificity, which was easy to use, less time consuming and less tedious. Based on this, we conducted questionnaire-based e-survey among Indian physicians on the use of 12 lead ECG in routine practice in their cardio-metabolic patients.

METHODS

A cross-sectional questionnaire-based e-survey (IOECG survey questionnaires tool) was conducted using Google forms from November 2021 to December 2021 (Figure 1). Data regarding screening of cardio-metabolic patients using ECG was collected. The physicians practicing independently across India were included in the survey. The e-survey link (https://docs.google.com/forms/d/e/1FAIpQLSdarlmL1oj FVcyHJVZBrx21tcuKFQGjUykklZ1qV_fqJJTB3Q/view form) prepared using Google form was shared with many physicians across India. The overall information regarding use of ECG in their cardio-metabolic patients was collected. Number of responses to each question was categorized and percentages for all responses were automatically calculated in Google form survey tool. Total 1863 physicians participated in this e-survey.

RESULTS

Total 1863 physicians participated in this e-survey. The results of the survey were subjective based on the physicians' clinical experience and practice in India. In our e-survey, 90.6% of physicians advised to their cardio metabolic patients to undergo ECG in routine clinical practice (Figure 2). This depicted the need of ECG screening among high risk cardio metabolic patients.

Depending upon the condition of patients, physicians recommend ECG testing to their patients in routine clinical practice. According to the e-survey, only 5.3% of physicians suggested their high-risk cardio metabolic patients to undergo ECG less than once in 2 year, 23.7% of physicians suggested once a year, while 18.9% of physicians suggested twice a year in their practice (Figure 3).

Regarding the number of patients screened using ECG test in day-to-day practice, 35.6% of physicians were able to screen only 20-40% of patients, while 25.4% of physicians were able to screen only 20% of their patients in the clinic during routine practice (Figure 4).

At present, fewer number of high-risk cardio metabolic patients are being screened with 12 lead ECG by Indian physicians due to many practical challenges. Our survey depicted that 40.2% of physicians felt 12 lead ECG was too time consuming, 35.8% of physicians believed the unavailability of 12 lead ECG device was common reason while 27.5% of physicians believed there was a lack of trained staff (Figure 5).

Out of 1863 physicians, 76.9% physicians agreed that time duration for ECG procedure was one of the major constrain in busy OPD practice (Figure 6).

Among the cardio-metabolically deranged patients, 68.1% of physicians believed that ECG screening for cardiac rhythm abnormalities detection is essential for patients

with hypertension and CVD, 60.9% of physicians believed for patients with history of cardiac arrhythmia, 58.3% of physicians believed for patients with hypertension and diabetes, while 49.3% of physicians believed for patients with uncontrolled hypertension (Figure 7). 97% of physicians believed that early detection of rhythm abnormalities through mass ECG screening can save many lives of patients (Figure 8).

Point of care (POC) ECG device can be helpful tool for mass screening of cardio metabolically deranged patients in busy OPDs and 69.7% of physicians agreed with the same in our e-survey (Figure 9). Majority of physicians (88.7%) will appreciate if POC ECG device with good sensitivity and specificity is available in the clinic for mass screening of such patients (Figure 10).

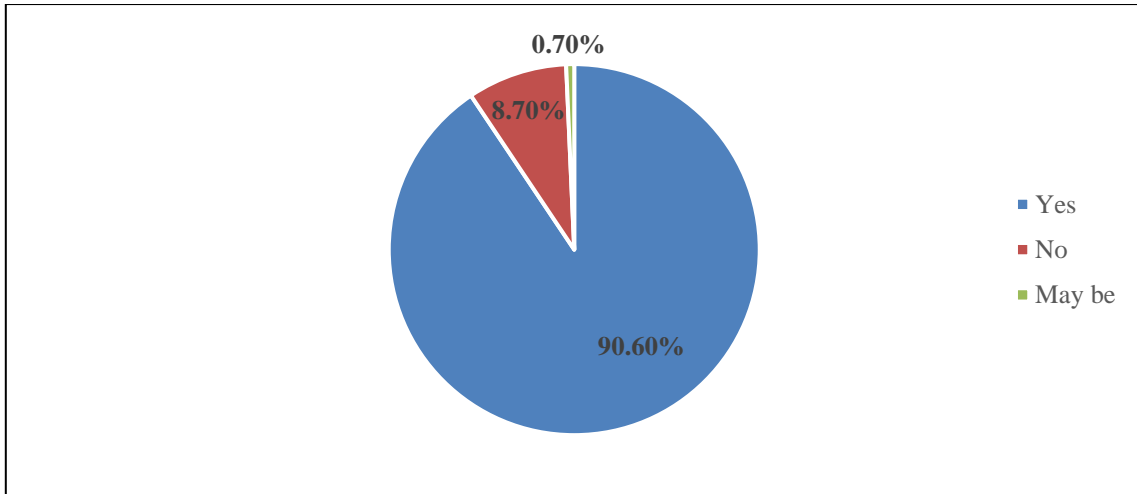**Figure 1: IOECG survey questionnaires tool.**

Figure 2: Physician's advice for ECG test to cardio-metabolic patients.
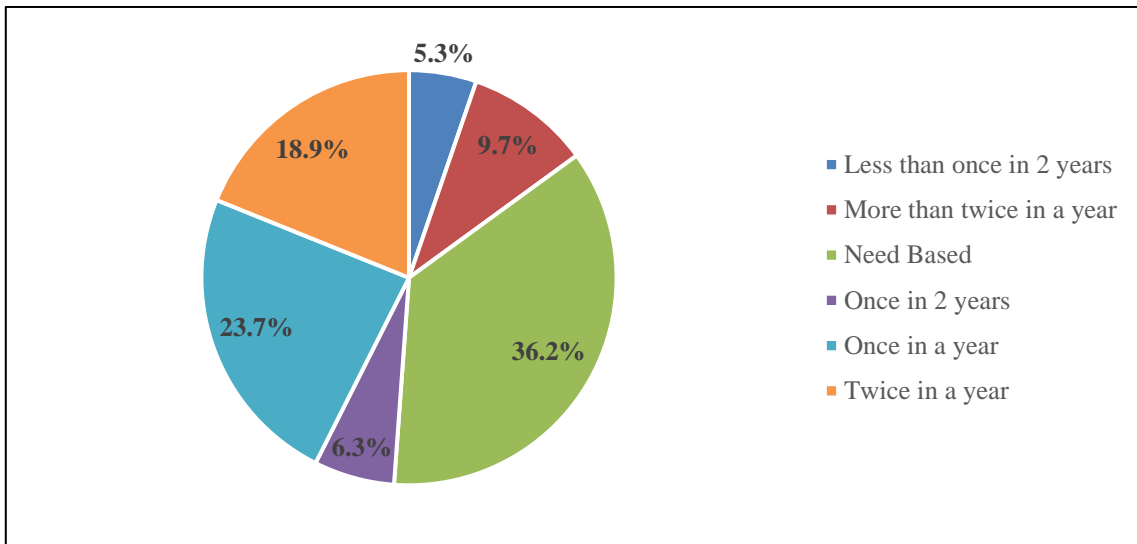

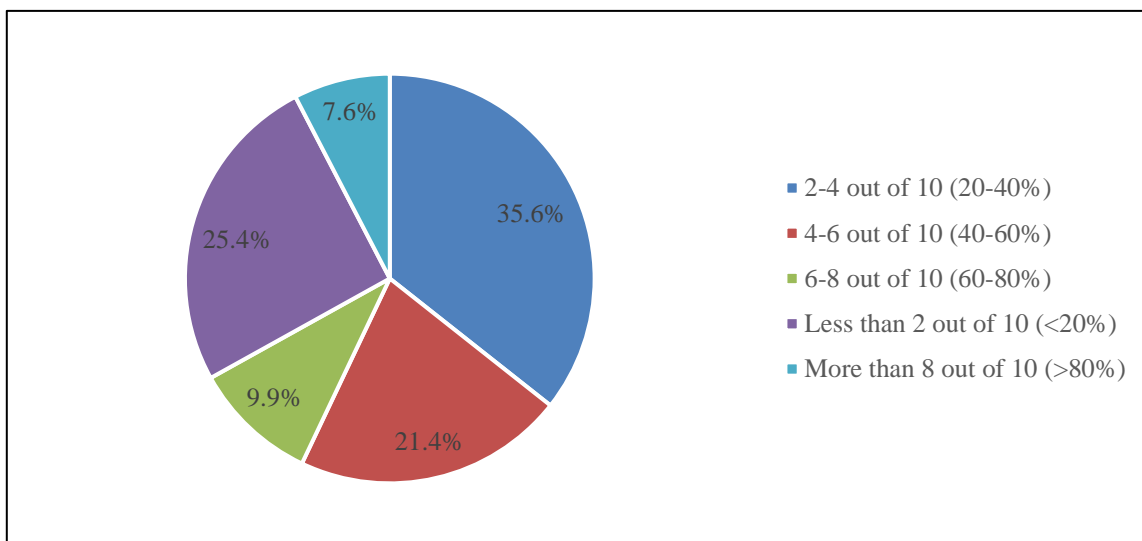**Figure 3: Frequency of ECG test suggested by physicians.**

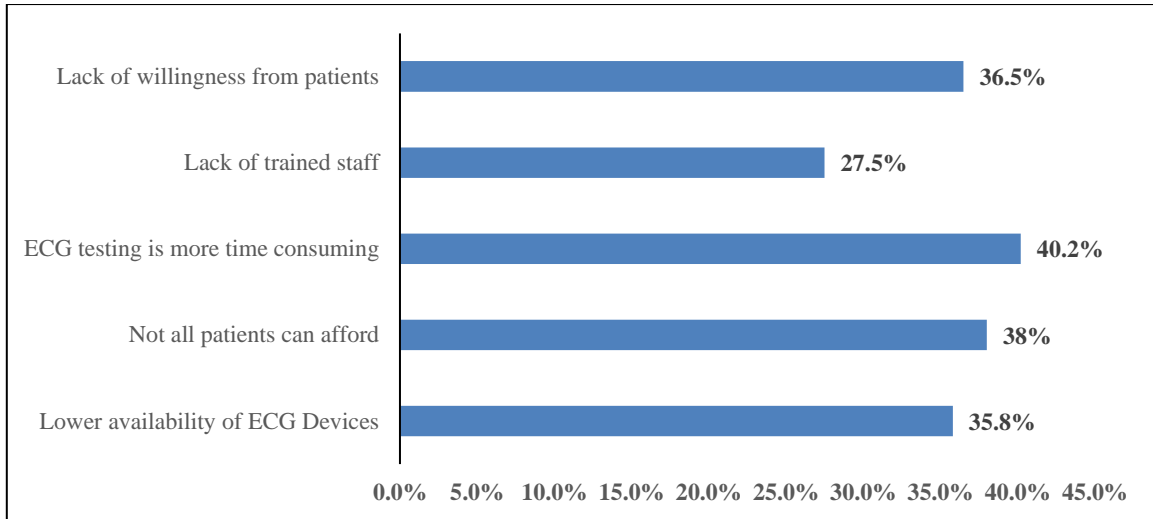**Figure 4: Number of patients screened with ECG test.**

Figure 5: Practical challenges in regular ECG screening of cardio metabolic patients.
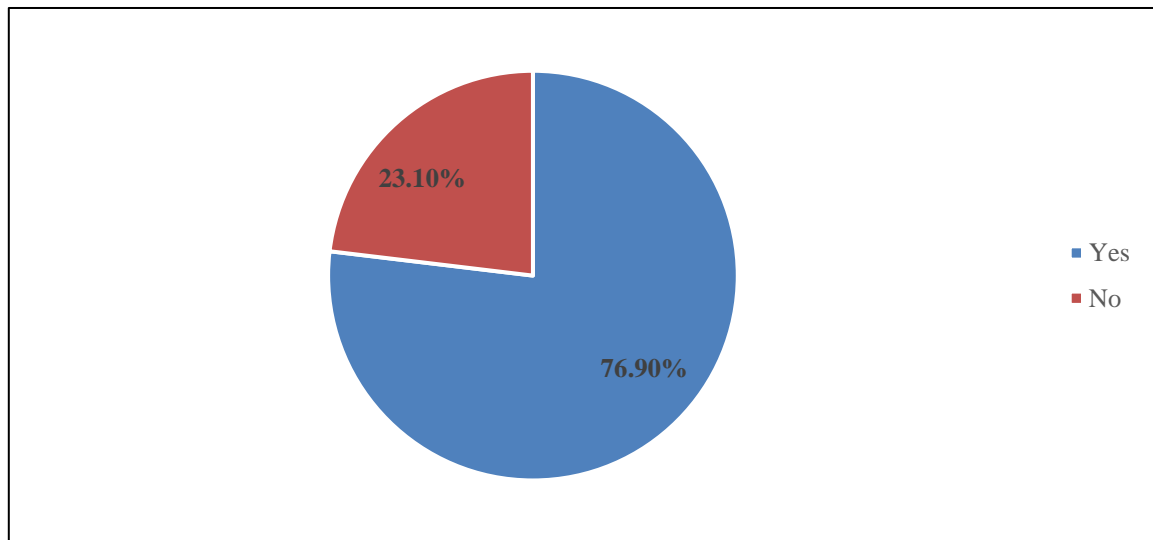

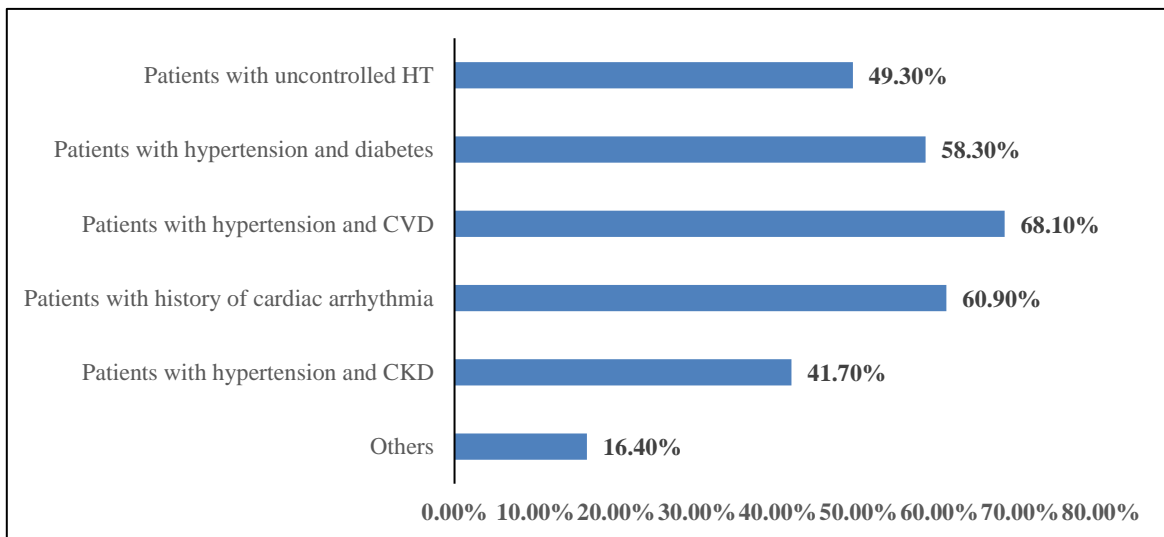**Figure 6: Time duration for ECG procedure-a major constrain in busy OPD practice.**

Figure 7: Class of patients in which ECG monitoring is essential.
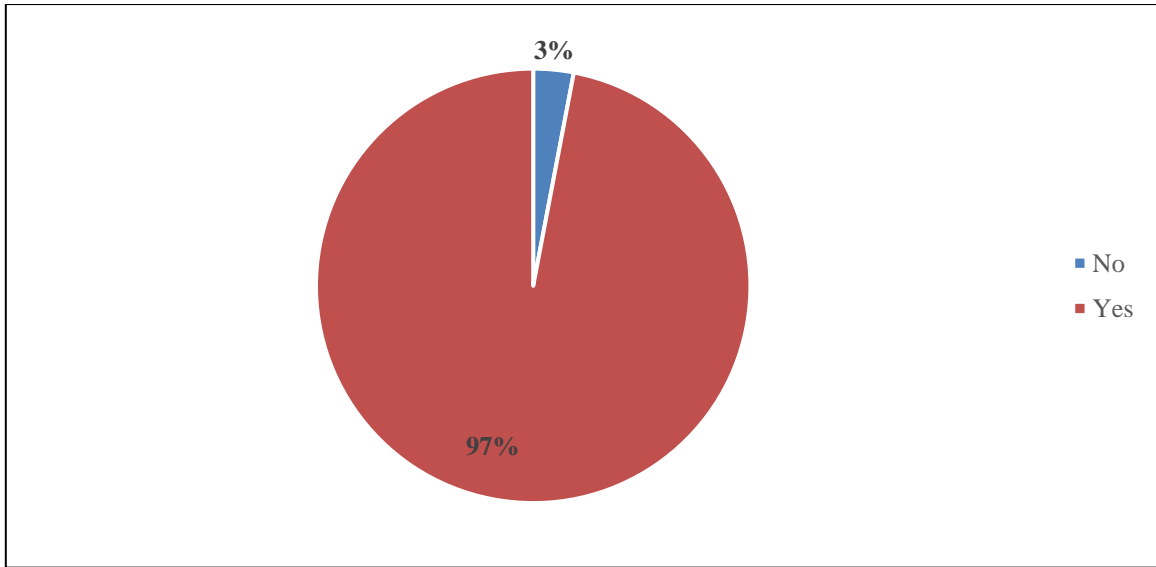
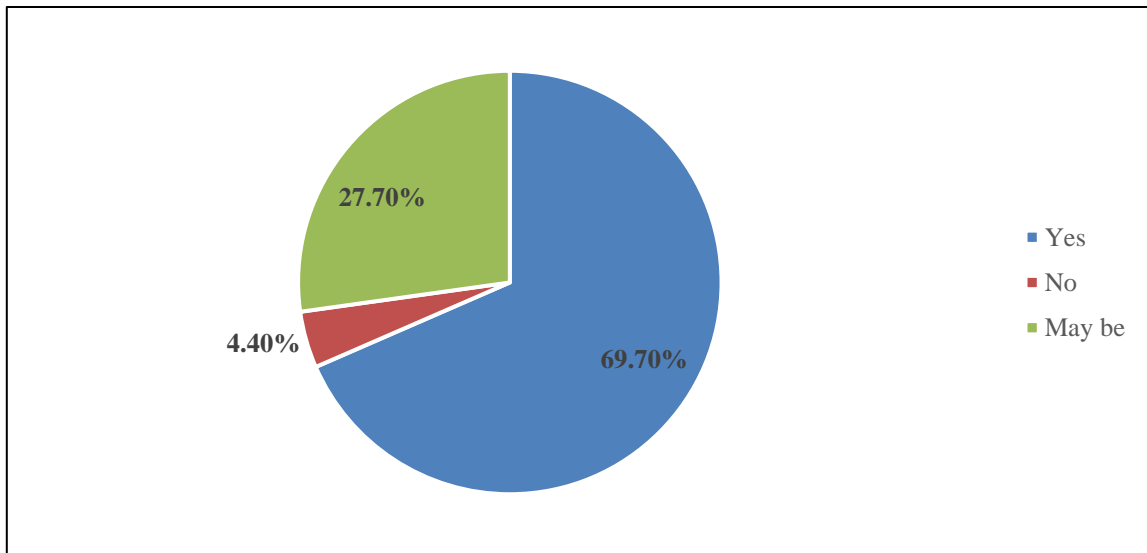**Figure 8: Early detection of rhythm abnormalities and its clinical importance.**

Figure 9: Point of care ECG testing device as a screening tool.
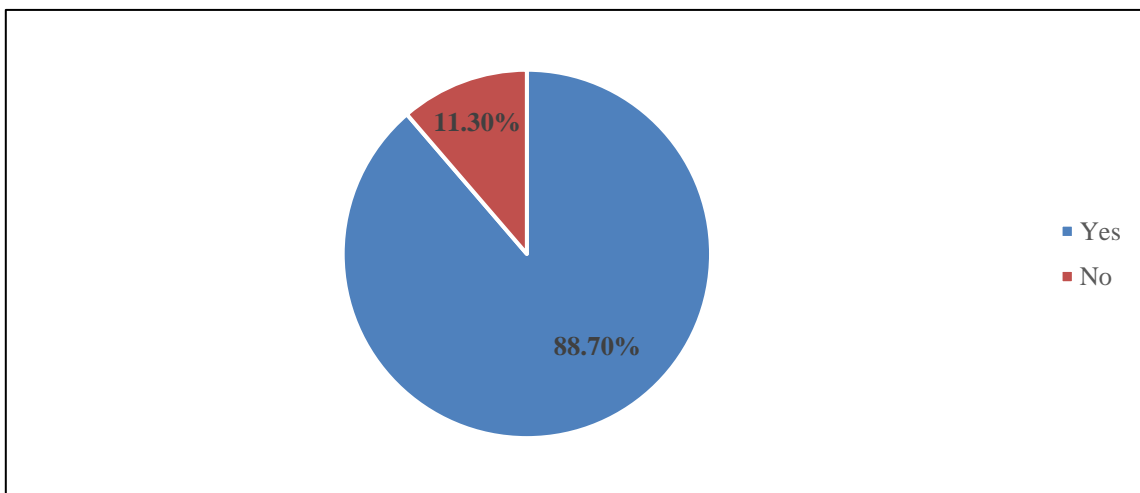

Figure 10: Empowerment of clinics with portable office ECG device.

DISCUSSION

Today's major challenge in healthcare of India is the swift spread of CVD. As CVD continues to create new challenges, innovative tools are required to boost the screening of such diseases. Advances in technology in the field of medicine have provided portable ECG technology that can effectively screen for certain heart abnormalities in the absence of conventional ECG machines at physician level.[8,13] These devices have been validated in clinical practice and showed a high level of agreement and strong co-relation between hand held ECG (Kardia 6 lead) and 12-lead ECG device.[13-15]

Kardia mobile 6L (first and only FDA cleared device) is low-cost, compact and handheld ECG device now used increasingly world over by physicians and patients for screening and diagnostic purpose. Portability, size, cost and data storage and transfer make these monitors potentially useful in clinical practice where 12 lead ECG recorders were not available or difficult to provide (need a private room with sofa, operator with sufficient experience, consumables like ECG electrodes, cleaning materials for cables can be time consuming). Recording with Kardia mobile 6L can be done almost immediately within few seconds while the patient is sitting.[14,15]

When discussed individually with physicians, each one agreed that cardio-metabolically deranged patients should be routinely subjected to ECG monitoring. Hence, we performed a survey among 1863 physicians in India about their current practices of using ECG assessment in screening of cardio metabolic patients. The survey showed that while 90% of physicians agreed to the necessity of doing ECG of cardio-metabolically deranged patients, only 61% of all physicians could perform ECG screening in less than 40% of cardio-metabolic patients. According to our survey, there were many practical challenges while screening high risk cardio-metabolic patients with 12 lead ECG. 40.2% of physicians believed that 12 lead ECG was too time consuming, 35.8% of physicians believed the unavailability of ECG device was common reason while 27.5% of physicians believed there was a lack of trained staff. Majority of physicians (69.7%) agreed in use of point of care ECG device which can be a solution for mass screening of cardio metabolically deranged patients whether symptomatic or asymptomatic. According to the survey, 88.7% physicians would appreciate if such portable handheld ECG device was made available to facilitate screening of such high risk patients in their practice.

Limitations

The study had some limitations. First, this was the e-survey and not a face-to-face survey which could impact the quality of responses collected. Secondly, the responses of e-survey were subjective and may have so called possibility of response bias. Third, the e-survey questionnaires were close ended which may have influence on the final results. Despite these limitations, this e-survey helped physicians to understand the current practice of ECG use for screening of cardio-metabolic patients.

CONCLUSION

Majority of Indian physicians believed the need of ECG screening of cardio-metabolically deranged outpatients in their routine clinical practice. However, due to several practical challenges, not all physicians could perform ECG screenings in all outpatients. Therefore, there is a need of the novel portable handheld ECG device which helps physicians to screen large number of such patients in their busy OPDs.

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