

# Attitude and practice of brachytherapy in India: a study based on the survey amongst attendees of Annual Meeting of Indian Brachytherapy Society

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## Abstract

**Purpose:** We performed a survey amongst attendees of the 4<sup>th</sup> Annual Meeting of Indian Brachytherapy Society to study the patterns of brachytherapy practice and attitude towards brachytherapy use.

**Material and methods:** A 19-point questionnaire was designed and e-mailed to the attendees immediately after the conference. Descriptive analysis of the responses were done and satisfaction index was used as a tool for evaluation of the program effectiveness. Binomial test was used to assess the difference between distributions of responses and Mann-Whitney *U* test was used to assess the correlation between responses. *P* value (2-tailed) of < 0.05 was taken significant for all statistical analysis.

**Results:** Of a total of 202 attendees, 90 responded to the survey (response rate: 44.5%). Seventy-two percent belonged to an academic institute while 28% belonged to non-academic institutes. Eighty-six percent were radiation oncologists and 10% were medical physicists. Eighty-nine percent respondents used high-dose-rate, 14% - pulse-dose-rate, and 13% used low-dose-rate brachytherapy facility. Orthogonal X-rays, computed tomography, and magnetic resonance imaging was used for brachytherapy planning by 56%, 69%, and 14%, respectively. Ninety-three percent of them thought that lack of training is a hurdle in practicing brachytherapy and 92% opined that brachytherapy dedicated meetings can change their perception about brachytherapy. Seventy percent respondents admitted to make some changes in their practice patterns after attending this meeting. Ninety-seven percent of them would like to attend future meetings and 98% felt the need to include live workshops, hands on demonstrations, and video presentations in the scientific programme.

**Conclusions:** The survey highlights a positive attitude towards increasing brachytherapy use, and may serve as an important guiding tool in designing teaching and training programmes; thus overcoming the hurdles in successful and widespread use of a quality brachytherapy programme at radiotherapy centers.

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**Key words:** brachytherapy, conference, India, survey.

## Purpose

Brachytherapy has been a time tested and indispensable modality of treatment for a variety of cancers for more than a century. Time and again it has been proven that brachytherapy independently improves survival [1, 2] and exclusion of brachytherapy from the management of some cancers can be detrimental [2, 3]. The data on decline of brachytherapy use [2] needs to be interpreted with caution as sometimes the data from registry or population database could be misleading due to changes in coding and reporting patterns [3]. Apart from established indications [4, 5], brachytherapy has expanded wings to novel and innovative indications like brain, liver, penile, lung, and intra-thoracic brachytherapy [6, 7, 8, 9]. Brachytherapy planning has also evolved from point based prescrip-

tion to volume based and from X-ray based to magnetic resonance imaging (MRI) based planning [10, 11].

With the evolution in brachytherapy practice, it is important to know the current change in practice as well as attitude of practicing medical physicians as well as other professionals actively involved in the field. While such surveys are available from the western world [11, 12, 13], one is lacking from India. Available survey [11] also does not address the specific question appropriately and have missing information on the use of interstitial brachytherapy [14]. The burden of cancer in India is different from other parts of the world; having higher incidence of oral cavity cancers and cancers of uterine cervix [15]. The increasing trend towards early detection of cancers [16] may further necessitate increased use of brachytherapy in

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quest of shorter duration of treatment and organ preservation. The limited availability of brachytherapy facilities [17] as well as advanced planning system poses different challenges and hurdles in brachytherapy training and practice in India. Hence, the needs, perspectives, and practices are quite different from the western world.

Attendees of AIIMS-IBS (4<sup>th</sup> Annual Meeting of Indian Brachytherapy Society) meeting are particularly those who are interested and actively involved in the brachytherapy practice, and their opinion may reflect the prevailing scenario of brachytherapy practice. We intended to study the patterns and attitudes of brachytherapy practice though this post-conference descriptive online cross-sectional survey.

## Material and methods

The AIIMS-IBS was held at New Delhi, India from 14<sup>th</sup>-16<sup>th</sup> March, 2014. The scientific program was designed with the objectives of acquainting the post-graduate students and practicing physicians with: 1) indications and techniques of brachytherapy for various malignancy sites; 2) generate awareness about innovations and advances in brachytherapy; 3) expose the attendees to experience of interstitial brachytherapy for difficult sites; 4) motivate the students and physicians for further refining their practice of brachytherapy. The conference included dedicated sessions on brachytherapy in urologic, gastro-intestinal, breast, gynecologic, thoracic, head and neck, soft tissue sarcomas, and cutaneous malignancies. Lectures were delivered by renowned experts on interstitial brachytherapy for less common sites like brain, lung, liver, and bone. Innovative topics among others included organ sparing spacer techniques and integration of systemic therapy with brachytherapy. Other sessions included panel discussion, debates, oral and poster presentations, and video sessions highlighting brachytherapy procedures, plenary talks and interactive sessions of attendees with professors. This descriptive cross sectional study was carried out immediately after the conference. A web based 19-point questionnaire (Table 1) was designed and e-mailed to the attendees. The e-mail contained a brief purpose of the survey and the survey included in the mail itself, and also a web link to access the questionnaire. E-mail and name were used to avoid duplicate submissions. The questionnaire consisted of demographic details (items 1-3), current brachytherapy practice (items 4-5), perception towards education, and change of brachytherapy practice (items 6-11); satisfaction level for present meeting (item 12-13), attitude towards attending and suggestions for improvement of brachytherapy meetings (item 14-19). Items 1-16 were single or multiple choice questions and items 17-19 were descriptive answer type questions. The replies of the respondents were not accessible to other respondents. There was no option of changing the replies once submitted in the web portal. The survey web form was closed on 30<sup>th</sup> April 2014. Respondents were given the option of concealing their identity and their identity was kept confidential. Descriptive analysis of the responses was done. Binomial test was used to assess the difference between

distributions of dichotomous responses. Mann-Whitney *U* test was used to assess the correlation of Likert-scale responses (item numbers 12-13). Statistical analysis was done with SPSS version 21.0 (SPSS Inc., Chicago, IL, USA). *P* value (2-tailed) of < 0.05 was taken significant for all statistical analysis. We used satisfaction index (SI) as suggested by Guilbert *et al.* [18]:

$$SI = \frac{\{(a \times 1) + (b \times 2) + (c \times 4) + (d \times 5)\} \times 20}{N}$$

where, *a-d* are total responses for the co-efficient 1, 2, 4, 5, respectively, and *N* - total number of participants. Satisfaction index was used for items 12-13 and the co-efficient 1, 2, 4, 5, respectively, correspond to "Strongly disagree", "Disagree", "Agree", and "Strongly agree". Maximum score possible for SI was 100.

## Results

Of a total of 202 attendees, 90 responded to the survey yielding a response rate of 44.5%. The demographic profiles presented are for the 90 responding attendees. Male : Female ratio for the respondents was 64 : 26. Seventy-two percent of the respondents belonged to an academic institute (institute having radiation oncology teaching programme) while 28% belonged to non-academic/private institutes. Eighty-six percent were radiation oncologists and 10% were medical physicists. 28.9% were post-graduate students, 13.3% were post graduate registrars, and rests of them were faculties.

Eighty-nine percent respondents used high-dose-rate, 14% - pulsed-dose-rate, and 13% - low-dose-rate brachytherapy facility. Orthogonal X-rays, computed tomography (CT), and MRI was used for brachytherapy planning by 56%, 69%, and 14%, respectively. Table 2 summarizes the descriptive response of the participants to items 6-11. Thirty-six percent of the respondents strongly agreed to fact that the scientific content of the meeting pertained to the needs of the brachytherapy education; while 56% agreed and 8% disagreed to this (Mann-Whitney; *p* = 0.006). Seventeen percent strongly agreed and 50% agreed to the notion that the scientific programme of the present meeting was comparable to the international conferences. At the same time, 33% disagreed to this notion (Mann-Whitney; *p* = 0.023). Satisfaction index to scientific content of the present meeting was 80% and SI as compared to international brachytherapy meeting was 75%. Ninety-six percent felt that initiative should be taken to start national and international fellowships for promotion of training in brachytherapy. Ninety-seven percent desired to attend future national/international workshops/conferences on brachytherapy and 98% felt the need to include live workshops, hands on demonstrations, and video presentations in the scientific programme.

The most liked presentation/session was debate (Can intensity modulated radiotherapy replace interstitial brachytherapy in carcinoma cervix?) followed (in that order) by video presentation session, lectures on interstitial brachytherapy for brain tumors, and interstitial brachytherapy for pediatric and soft tissue sarcomas. Respondents were inclined towards changing their

**Table 1.** Web Survey Form

Name and Institution (optional) .....	Answer Choices
1. Type of Institution	Government medical college Private Institution with teaching facility Private institution Others
2. Are you a ..... ?	Radiation oncologist Medical Physicist Others
3. Present affiliation	Teaching faculty Faculty Resident Medical Physicist Others
4. What brachytherapy facility do you have at your center? (check all that apply)	High-dose-rate Low-dose-rate Pulse-dose-rate Manual after loading Others
5. What imaging modality do you use for brachytherapy planning at your centre? (check all that apply)	Orthogonal X-ray CT MRI Others
6. Do you think lack of training/education is a hurdle in practicing brachytherapy?	Yes No Don't know
7. Do you think conferences like AIIMS-IBS can make a change in the way you perceive brachytherapy?	Yes No Don't know
8. Based on the lectures in the conference, would you prefer brachytherapy to other conformal radiotherapy wherever applicable like brachytherapy for liver malignancies instead of intensity modulated radiotherapy or stereotactic body radiotherapy?	Yes No Don't know
9. Would you change your practice patterns (indications of brachytherapy, techniques etc.) after attending AIIMS-IBS?	Yes No Don't know
10. Would you discuss innovative techniques of brachytherapy viz. brachytherapy for brain tumors, liver and lung malignancies, penile tumors, and spacer techniques presented in the conference with your colleagues?	Yes No Don't know
11. Do you feel that medical council of India should make it mandatory for radiotherapy centers to have brachytherapy facility?	Yes No Don't know
12. Scientific content of AIIMS-IBS pertained to the needs of brachytherapy education and it was good?	Strongly disagree Disagree Agree Strongly agree
13. Scientific programme of AIIMS-IBS was comparable to international brachytherapy conferences viz. ABS.	Strongly disagree Disagree Agree Strongly agree
14. Would you like to attend future national/international conferences on brachytherapy?	Yes No Don't know
15. Do you feel Indian brachytherapy society should take the initiative to start national/international fellowships for training in brachytherapy?	Yes No Don't know
16. Do you think brachytherapy meetings should include live workshops/demonstrations/video presentations in the scientific program?	Yes No Don't know
17. What one change would you bring or think to bring to your practice of brachytherapy after attending the AIIMS-IBS? .....	
18. Which one presentation topic you liked the most in AIIMS-IBS? .....	
19. How can future annual meetings of Indian Brachytherapy Society be further improved? (please suggest if any) .....	

CT – computed tomography, MRI – magnetic resonance imaging, AIIMS-IBS – 4<sup>th</sup> Annual meeting of Indian Brachytherapy Society

**Table 2.** Descriptive analysis of participant's response (N = 90) [items 6-11]

Parameter	Yes	No	Binomial test (p value)
Do you think lack of training/education is a hurdle in practicing brachytherapy?	84 (93%)	4 (7%)	0.0001
Do you think conferences like the present one can make a change in the way you perceive brachytherapy?	83 (92%)	6 (8%)	0.0001
Based on the lectures in the conference, would you prefer brachytherapy to other conformal radiotherapy wherever applicable like brachytherapy for liver malignancies instead of intensity modulated radiotherapy or stereotactic body radiotherapy?	64 (71%)	21 (29%)	0.0001
Would you change your practice patterns (indications of brachytherapy, techniques etc.) after attending the present conference?	63 (70%)	19 (30%)	0.0002
Would you discuss innovative techniques of brachytherapy viz. brachytherapy for brain tumors, liver and lung malignancies, penile tumors, and spacer techniques presented in the conference with your colleagues?	83 (92%)	5 (8%)	0.0001
Do you feel that medical council of India should make it mandatory for radiotherapy centers to have brachytherapy facility?	76 (84%)	6 (16%)	0.0001

brachytherapy practices like use of ablative brachytherapy for liver, lung, and penile malignancies. Participants also felt the need to start multi-institutional collaboration for trials on brachytherapy, initiate brachytherapy tumor boards in concert with surgical oncologists, and also involve residents by focusing on brachytherapy based thesis and PhD projects. The respondents also felt the needs of the following for better educational experience from the brachytherapy dedicated conferences/workshops:

- Hands on training and demonstration for limited groups
- Live pre-conference brachytherapy procedure workshops
- Video presentations on common as well as difficult brachytherapy procedures
- Quiz for the post-graduate residents
- Debate topics and panel discussions
- Organ specific/site wise workshops and symposiums
- Contouring sessions for image based brachytherapy
- Radiobiology and physics topics pertaining to clinical and basic brachytherapy principles
- Interactive/brain storming sessions with post-graduate students

## Discussion

Teaching and training programmes are integral part of physician's learning and helps in updating knowledge of the subject. Scientific meetings having well designed programmes can bridge gaps in understanding of the subject and also update the knowledge regarding various aspects viz. clinical, biological, and technological advancements. It can further promote learning by motivating the physicians and also by encouraging self-directed learning in the long run. Donald Kirkpatrick [19] published four level training evaluation models in 1959 and subsequently updated their work in 1994. The accepted levels of evaluation are: reaction, learning, behavior, and results. Of these, reaction and learning can be evaluated by survey questionnaire. Although, learning is best assessed by pre-post inter-

vention test, this can also be reliably done with a retrospective questionnaire as has been used by us in this study. We intended to analyze the reaction as well learning, attitudes and practices of brachytherapy, and gain feedback from attendees in order to further improve future brachytherapy meetings.

The majority of attendees belonged to academic institutes (70%), 30% of respondents were residents and this reflects the inquisitiveness of younger generation towards learning nuances of brachytherapy. Most of them are using high dose rate brachytherapy facilities (89%). Fifty-three percent use orthogonal X-ray based treatment planning and this is corroborative with 43% members in United States [11]. Computed tomography and MRI based brachytherapy planning in our study as compared to study by Viswanathan *et al.* [11] was 69% vs. 55%, and 14% vs. 2%, respectively. The discrepancy could be because of the different time points of survey and also overrepresentation of academic/teaching institutes in our study.

Brachytherapy is in true sense a multidisciplinary field and its practice has a learning curve. Acquisition of skills, advancement of knowledge over time as well as clinical experience acquired with more number of cases can affect the ultimate outcome of the patients, and this has been proven by Le Fur *et al.* [20] and Liu *et al.* [21] in their studies on brachytherapy implants for prostate cancers. Hence, it is important to infuse the interest of brachytherapy in the beginning of the radiation oncology teaching programme. While brachytherapy has been placed as a mandatory subject in the curriculum of post-graduate teaching/training program of radiation oncology in India [22], a structured brachytherapy curriculum with defined goal is lacking. A written and designed program directive was available to only 54% of the training residents in the study by Gaudet *et al.* [13]. In the same study, main barriers to brachytherapy education were lack of written guidance (55%), clinical workload (49%), and lack of time (37%). The barriers to practicing brachytherapy are mainly lack of infrastructure and inad-

equate training rather than insufficient patient numbers or absence of scientific evidence favoring brachytherapy [23]. Acquisition of skill in brachytherapy is a time taking process and it is disturbing to note physicians discontinuing practice of brachytherapy owing to reassignment and lack of a local program, and this could be as high as 49%, as noted in the Canadian survey by Rose *et al.* [23]. The authors also noted that the common sites discontinued were head and neck cancers, cervical cancers, and endometrial cancers, and ironically scientific evidence for the use of brachytherapy in these sites are time-proven and robust. In another study by Fumagalli *et al.* [24], 82% of the residents felt that insufficient teaching has been imparted to them during residency and only 50% performed one brachytherapy treatment during residency. The interest of brachytherapy among residents in training is guided mainly by requirement of the accreditation council [25] as well as the benefit of knowledge of brachytherapy in staff recruitment [23]. Compton *et al.* [25] found a decreasing trend in the mean number of brachytherapy procedures performed by residents (80.8 in 2006-2007 to 71.0 in 2010-2011) and also a decrease in the average number of interstitial procedures by 25%. The trend in decline of brachytherapy training experience should be an alert to the community of brachytherapy and avenues must be created to increase the interest as well as provide more opportunities for training. Gaudet *et al.* [13] suggested introduction of a formal credentialing and certification process in brachytherapy, and this was supported by 80% and 81% of practicing radiation oncologists and residents, respectively. Although, a final solution of this issue may lie in bringing changes in the residency programs to better suit the needs of brachytherapy teaching, educational activities like conferences may be the initial motivating step. Ninety-two percent in our survey felt that this conference has changed the way they perceive brachytherapy and 70% were likely to change their practice patterns after this meeting. Eighty-four percent felt that regulatory authorities should approve comprehensive radiotherapy centres only if they have brachytherapy facilities, and this might improve the availability and indirectly the scope of skill development.

Brachytherapy has emerged as a competitive option to external beam therapy/surgery in many clinical situations [26, 27, 28, 29]. While modern external beam radiotherapy techniques can give an aesthetically appealing dose distribution, it cannot match the dose conformity achieved with brachytherapy. Ninety-two percent of the attendees committed to prefer brachytherapy to intensity modulated radiotherapy or stereotactic ablative radiotherapy in clinically relevant situations. Novel and innovative indications of brachytherapy has also brought a state of dilemma in some of the physician's mind, particularly those not adequately trained in brachytherapy. Debates on cutting and controversial issues may be the best form to discuss and prove the most suited form of radiation modality, and it also leaves more impact on young mind of the residents. This is also supported by the results of our study; most liked presentation in our study was debate comparing role of brachytherapy ver-

sus modern external beam radiotherapy techniques in the management of cervical cancer. This form of discussion should be encouraged at future brachytherapy meetings.

With the technical advancement, the modes of teaching have also become more sophisticated. Novel methods of imparting training and skills have been developed. Use of phantom simulator for prostate and gynecological brachytherapy has been described by Thaker *et al.* [30] and de Almeida *et al.* [31], respectively. Such facilities, although desirable, may not be available at most centres. Other modes of teaching like video presentation, hands on training, and live demonstration might be very useful to attendees of the brachytherapy meeting. Ninety-eight percent of the respondents in our survey also felt the need to include the same in brachytherapy meetings. The internationally accepted norm for the unsatisfactory outcome for SI is at < 60% [18]. Satisfaction index for the scientific content of the present meeting as well as its comparison with international meetings were 80% and 75%, respectively. Although use of SI index for brachytherapy meetings is lacking, Singh *et al.* [32] used SI index to evaluate their continued medical education program and found their program to have an index of 85-87% for various satisfaction endpoints. The current SI index of our study reflects the effectiveness of the present scientific deliberations as well as scope for future improvement in the planning, conduct and content of the national brachytherapy meetings.

Overall, the meeting shows an impressive impact on the attendees in terms of gaining new knowledge, change in perception and attitudes towards brachytherapy as well as in terms of motivation for further educational activities. Ninety-seven percent of the attendees wished to attend future meetings on brachytherapy. Our study highlights the needs and demands of the practicing physicians and residents pertaining to brachytherapy. The views of the attendees reflect the need for courses directed towards practical skill development of brachytherapy. Our study provides the program objectives to be kept in mind in the design and conduct of brachytherapy educational activity. Hands on training and practical demonstration of brachytherapy procedures would stimulate interest as well as help in development of skill and confidence.

Our study has several limitations. The opinion of the attendees of the meeting might not be a true representation of the entire radiotherapy community interested in brachytherapy. A smaller sample size of the respondents is another shortcoming in itself. Although a more appropriate way of doing a survey is to include individuals from each single institution practicing brachytherapy, the hurdles of doing the above in reality are tremendous. There is no national database of the practicing radiation oncologists and membership to societies is also not universal. Functioning brachytherapy facilities are limited in number and all institutions might not be accessible to these surveys. Surveys of a specific community (like attendees of brachytherapy/workshop meeting) might be a quick and informative way to capture scenario and patterns of practice. Similar to ours, Buyyounouski *et al.* [33] surveyed

the attendees of 7<sup>th</sup> American Brachytherapy Society prostate brachytherapy school and accepted the bias inherent to such surveys. A further follow up survey from these respondents would be able to assess the change in behavior and long term impact on the practice patterns arising out of this educational activity. Nevertheless, this remains the only survey from India pertaining to brachytherapy attitudes and practices. The practice patterns reported in our study may be very useful for comparison with the internationally reported literature and may also provide insights in formulation and conduct future nationwide surveys.

Challenges and hurdles faced by us in brachytherapy teaching, training and education may not be unique to our country and in fact would be shared by many of the other countries where brachytherapy practice is sparse, diverse, and not standardized like ours. This is reflected by the absence of such surveys from other parts of the world except USA and Canada. The results of our study would encourage other countries to take up these surveys and understand the knowledge, attitudes, and practices specific to them as well as common to ours. This may further yield solutions and ideas, which could be applicable in a wider sense.

## Conclusions

In summary, the survey highlights the attitude, perception, and practices of brachytherapy in India. Majority use high dose rate brachytherapy facility and CT scan is the commonest imaging modality used for brachytherapy planning. Results of our study would provide invaluable inputs in the design of not only brachytherapy teaching programs in institutes but also help in the design and conduct of training and educational programs pertaining to brachytherapy both in and outside India.

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## Disclosure

The study was presented in abstract form as poster presentation (PO 53) at the 36<sup>th</sup> annual meeting of the American Brachytherapy Society at Florida, USA (April 9-11, 2015); *Brachytherapy* 2015; 14 (Supplement 1); S-102-103. Authors report no conflict of interest.

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