Review of literature

2.1 History of EBP

The definition of EBP was coined in the 1900. The modern era of EBP began in the twentieth century. Archibald Cochrane and David Sackett are considered as fathers of evidence-based medicine in this era.\textsuperscript{12,13} Professor Archibald Leman Cochrane, a British medical researcher promoted the randomized trial and reported the first randomized trial of aspirin in the prevention of vascular disease. Archie Cochrane’s book: Effectiveness and Efficacy: Random Reflections on Health Services (1972) contributed richly to the principles of EBP. David Sackett an American-Canadian medical doctor is well known for his contribution to Clinical Epidemiology and Evidence-Based Medicine. He was a visionary and established innovative methods in medical education at McMaster University. He taught that best patient care is based on the best scientific evidence, and not on tradition, expert opinion, conventional wisdom or wishful thinking. He was a mentor to Dr. Gordon Guyatt and Dr. Sharon Straus who describe him as a person with excellent critical thinking and mentorship skills, respectively, with an immense, genuine interest in patient care.\textsuperscript{14}

2.2 Evidence based practice: a global revolution

The concept of evidence based practice is evolving. Policy makers, academicians and health professionals all over the world have accepted it with mixed reactions of enthusiasm, fear, misunderstanding and criticism. Sackett 1996, Marshal 1995, Macdonald 1999, Sackett 2000, Gambrill 1999, Gray et al 2001, Gibbs et al 2002 have all regarded EBP as one of the major advances in several fields including
healthcare, education, judiciary, and the human services, which would bring a
revolution in both practice and policymaking. 3, 15-20, but Grahame-Smith and
Morgan have also criticized it as a development designed for the benefit of
insurance companies that will compel professionals to follow guidelines like recipe
cookbooks without thinking. 21,22

Straus et al 2000 highlights the primary misperceptions: 23

(1) It disrespects clinical expertise,

(2) neglects patients’ values and preferences,

(3) promotes a “cookbook” approach to medicine,

(4) is a cost-cutting tool,

(5) is an delusional concept,

(6) is limited to systematic reviews and randomized controlled trials,

(7) is only about critical analysis and inferential statistics and

(8) leads to therapeutic emptiness in the absence of evidence from randomized
trials.

2.2.1 Misperception: EBP disrespects clinical expertise

One argument against EBP is that it is “cookbook” practice, which will replace a
healthcare professionals’ clinical judgment with written guidelines and procedures.
This will challenge the individuals inherent clinical knowledge accumulated
through patient care experiences and observations. However most of the proposed
EBP is fairly individualized based on the clinical expertise of the practitioner.
Sackett et al. stated that it is the practitioner’s “judgment” obtained during medical
training, continuing professional development, and accumulated clinical practice experience that should be considered when making patient care decisions. It is the clinician’s experience that refines their ability to diagnose accurately and plan individual patient care. “Evidence alone is never sufficient to make a clinical decision” which is rightly said by Guyatt et al. Evidence derived from systematic research is used to guide diagnosis and management, but it cannot be considered as the only ingredient for EBP.

2.2.2 Misperception: EBP ignores patient values and preferences

Just as the professionals’ clinical expertise is of relevance, similarly the patients’ wishes and values cannot be ignored. The patient should be explained about all the treatment options available, the current evidence relating to the patient condition and problem, the consequences of choosing a particular option. So, when they make a choice they are aware of the entire package of treatment and hence can make a better choice. As healthcare professionals we should respect that choice. In a systematic review and meta-analysis conducted on musculoskeletal trials by the Preference Collaborative Review Group, it was observed that patients who were randomized to their preferred treatment had a standardized effect size greater than that of those who were indifferent to the treatment assignment (effect size 0.162, 95% confidence interval 0.011 to 0.314; p=0.04). Participants who received their preferred treatment also did better than participants who did not receive their preferred treatment (effect size 0.152, −0.035 to 0.339), although this was not statistically significant (p=0.11). Participants allocated to their undesired treatment had outcomes that were no different from those who were indifferent.
2.2.3 Misperception: EBP is a cost-cutting tool

Mullen et al have labeled EBP as a cost cutting tool which will be used by governments and insurance companies, wherein they pay for only those services/treatments which have evidence and only for the number of sessions as mentioned in the best evidence available.\textsuperscript{26}

The promoters of EBP have counter argued the fact saying that the best evidence has to be looked at because it is concerned with the safety of the patient and community; and it depends on an individual clinicians’ choice to use it for the betterment of the patient. It is in line with the policy statement issued by WCPT.\textsuperscript{4,9}

In India, Physiotherapy services are not covered under insurance and hence adoption of EBP would genuinely promote development of the profession and create a scientific atmosphere.

2.2.4 Misperception: EBP is an ivory tower (delusional) concept

EBP has been regarded as an ‘ivory tower’ which is too difficult to practice. Studies have shown that the main barriers for implementation have been limited time, inability to apply research findings to patients, lack of understanding of critical analysis and statistics.

Turner P et al have reported that health professionals including physiotherapists primarily use treatment techniques and methods learnt during their basic entry-level training and in the event spend very little time actually reading clinical research.\textsuperscript{27, 28, 10} Most healthcare students usually read recommended and reference books suggested in their curriculum rather than investing time in reading scientific journals.\textsuperscript{29}
Promoters of EBP like Poolman et al have realized the need to accumulate evidence and present it in forms of systematic reviews and meta-analyses to help busy clinicians keep their knowledge updated. Databases like the Cochrane Collaboration, PeDRO, ACP Journal Club, synthesise summaries of research data in form of reviews which can be read easily. Gopalakrishnan et al have highlighted that instead of reading several randomized controlled trials, reading one systematic review or meta-analysis is more useful.

Another barrier has been limited understanding of statistics and critical analysis of an article. This is a skill and has to be learnt in entry level education. Most developed countries have adopted this in their entry level programs in a systematic manner.

2.2.5 Misperception: EBP is limited to higher order studies like randomized controlled trials and systematic reviews

EBP talks about adopting the best research evidence from systematic research. The ‘best’ here denotes the one that matches your clinical question. What is important is the question. Each research question will be answered by a different study design. The table below explains the primary types of clinical questions and types of evidence to answer the question.

Randomized controlled trials and systematic reviews have been regarded the ‘gold standard’ in medical literature for judging whether an intervention is beneficial with a minimal effect of bias. But an absence of an RCT or systematic review does not equate to no evidence. The evidence has been graded as per hierarchy, and when the highest order filtered information like meta-analyses or systematic reviews are not available, the next level should be considered.
Table 2.1: Types of clinical questions adapted from Fineout-Overholt et al.37

<table>
<thead>
<tr>
<th>Type of question</th>
<th>Description</th>
<th>Types of evidence to answer the question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therapy (Treatment)</td>
<td>Questions about the effectiveness of interventions in improving outcomes in patients. These are the most frequently asked.</td>
<td>Randomized Controlled Trial (RCT)</td>
</tr>
<tr>
<td>Prevention</td>
<td>Questions about the effectiveness of an intervention or exposure in preventing morbidity and mortality. When assessing preventive measures, it is particularly important to evaluate potential harms as well as benefits.</td>
<td>RCT or Prospective Study</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Questions about the ability of a test or procedure to differentiate between those with and without a condition or disease.</td>
<td>RCT or Cohort Study</td>
</tr>
<tr>
<td>Prognosis (Forecast)</td>
<td>Questions about the probable cause of a patient's disease or the likelihood that he or she will develop an illness.</td>
<td>Cohort Study and/or Case-Control Series</td>
</tr>
<tr>
<td>Etiology (Causation)</td>
<td>Questions about the harmful effect of an intervention or exposure on a patient.</td>
<td>Cohort Study</td>
</tr>
<tr>
<td>Meaning</td>
<td>Questions about patients' experiences and concerns.</td>
<td>Qualitative Study</td>
</tr>
</tbody>
</table>

The following image represents the hierarchy of evidence provided by the National Health and Medical Research Council (NHMRC).39
Figure 2.1: Hierarchy of evidence provided by the National Health and Medical Research Council (NHMRC)

Filtered information has been evaluated for quality in terms of validity, reliability and contains practice guidelines. For example:

1. Systematic reviews
2. Critically-appraised Topics
3. Critically-appraised Individual articles

Filtered literature is appropriate to use for clinical decision-making because the critical appraisal has been completed. Since the information provided is clustered from various studies on that topic, it will often provide a more definitive answer than individual research reports and thus save a lot of time. Few examples of filtered resources include Cochrane Database of Systematic Reviews, BMJ Clinical
Evidence, ACP Journal Club, PEDro (Physiotherapy Evidence Database) Database, DARE (Database of Abstracts of Reviews of Effects), and TRIP Database.

Unfiltered information is obtained from original published articles which have not yet been synthesized or clustered for review. As such, they are more difficult to read, interpret, and apply to practice. Examples of unfiltered resources include, CINAHL, EMBASE, Medline, and PubMed.\(^{40}\)

### 2.2.6 Misperception: EBP is only about critical appraisal and inferential statistics

One of the most cited barriers of EBP usage is lack of critical appraisal skills and understanding of inferential statistics. According to Dunn V et al, the major reason why evidence from research fails to get into practice; is majority do not understand statistics and cannot critically appraise a research paper. \(^{41}\)

Critical appraisal helps to decide the usefulness of the evidence in decision making by assessing the research process and results. It balances the assessment of benefits and strengths of research against its flaws and weaknesses. Khan et al., 1996; Moher et al, 1998 reported that studies which do not report their methods with complete rigor, overestimate the benefits of treatments by around 25%. \(^{42, 43}\)

“It usually comes as a surprise to students to learn that some (the purists would say 99% of) published articles belong in the bin and should not be used to inform practice” (Greenhalgh 2001). One has to be extremely careful while interpreting results so as to avoid making faulty decisions. \(^{44}\)

When interpreting results of a quantitative study especially involving intervention to know the effectiveness of a treatment over the control group, knowledge of statistics is of utmost importance. Understanding statistics enables us to sum up the
information and make it comprehensible. One can read and understand the results of a published study and draw appropriate conclusions about its usability. It will help to interpret data appropriately and to communicate your findings to others. There is a need to understand the clinical significance of a study over statistical significance (p-values, confidence intervals, power of a study, effect sizes). 45, 46

Inability to interpret results of a study creates a gap between research and practice. Improved understanding of statistics and critical appraisal skills will help bridge this gap. It is seen in several studies done by Aarons GA et al., Gorgon et al., Yousefi-Nooraie R et al., Maher CG, Slavin et al., that systematic instruction of this right from entry level education will inculcate the knowledge and attitudes required for EBP. 36, 47-51

Several critical appraisal tools have been designed to appraise the articles. Depending on the study design the appropriate tool must be chosen. Such tools, for example, are provided by the CASP (Critical Appraisal and Skills program), BMJ Best practices, PEDro scale for RCT.

Many indexed scientific journals provide reporting checklists to authors. 45 These checklists tell authors what information they need to include in their published papers to ensure that all aspects of the study are clearly reported to readers. Various checklists that are required are as follows:
Table 2.2: Checklists

<table>
<thead>
<tr>
<th>Types of study</th>
<th>Checklists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomized controlled trials</td>
<td>CONSORT</td>
</tr>
<tr>
<td>Systematic review articles and meta-analyses</td>
<td>PRISMA</td>
</tr>
<tr>
<td>Diagnostic validation studies</td>
<td>STARD</td>
</tr>
<tr>
<td>Observational studies including cohort, case control, cross-sectional studies and epidemiological studies</td>
<td>STROBE</td>
</tr>
<tr>
<td>Animal studies</td>
<td>ARRIVE</td>
</tr>
</tbody>
</table>

2.3 EBP and healthcare education

Schreiber J et al have observed on reviewing the literature and the history of EBP, it was found that prior to the mid-1970s, there was little need for evidence to support clinical decision making as the practice was largely directed by physicians. During the late 1970s & 1980s, physiotherapists began to assume more responsibility for clinical decision making which tended to be based primarily on intuition, trial & error & a blind clinging to what was traditionally followed. Studies published in 1997 & 1999 indicated that physical therapists tended to rely more heavily on initial education & training when selecting treatment techniques. Personal experience & ‘expert’ opinion guided clinical decision making throughout the 1990s. 52 Studies related to evidence based practice and education or training came forth from the year 2000.

The EBP movement worldwide has expanded to include educational processes involved in training health professionals. It refers to the processes used to develop EBP knowledge and skills and to the content of what is taught. Teaching the process of EBP involves helping students to pose answerable questions, seek,
critically appraise, and apply the research evidence to the clinical problem (Dawes et al. 2005). Traditional teaching methods have instructor-focused, “teaching by telling” approach which involves imparting knowledge as a collection of facts and skills in form of a lecture, with students being provided with readings and reference lists (Refer Table 2.3). In contrast to these traditional methods, EBP teachers are encouraged to involve students and adopt a participatory approach wherein they teach students the process of solving clinical problems, most often using a problem based learning approach, rather than teaching knowledge as a collection of facts and skills. 

Table 2.3: Difference between traditional and EBP teaching methods (Gibbs & Gambrill 2002)

<table>
<thead>
<tr>
<th>Traditional teaching methods</th>
<th>Methods for teaching EBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery of knowledge as a collection of facts and skills</td>
<td>Students are encouraged to form questions by developing their critical enquiry</td>
</tr>
<tr>
<td>Students are given handouts and instructed on reading recommended and reference books</td>
<td>Students conduct literature search to find articles and evidence relating to their question</td>
</tr>
<tr>
<td>Lectures and practicals are conducted for all the students</td>
<td>Teaching in small groups (Micro-teaching) is encouraged</td>
</tr>
<tr>
<td>Emphasis is on the right answer</td>
<td>Emphasis is on the problem solving process</td>
</tr>
</tbody>
</table>

EBP teaching promotes active learning. Scott Freeman et al. have highlighted the characteristics of active learning strategies as follows:

1. Students involved in learning.
2. Students engaged in activities
3. Less information transmission and greater focus on cognitive skills

4. Student motivated to learn.

5. Students have immediate feedback from instructor

6. Students use higher order thinking (analysis, synthesis, and evaluation)

This active interactive session between the teacher and student creates an opportunity for in-depth understanding with more emphasis on application. 53,55,56

The World Confederation for Physical Therapy (WCPT) advocates that physical therapists have a professional responsibility to consider the best available evidence during practice and base the management of patients on the same. Techniques and technologies that are ineffective or unsafe should not be used. WCPT’s has broad goals which promote very high standards of physical therapy practice, rooted in quality education and systematic scientific research [WCPT, Strategic plan, 2011-2015] 9

WCPT encourages its member organizations to facilitate the provision of relevant life-long learning activities that are fundamental to evidence based physical therapy practice, which should be introduced in entry-level physical therapy education programs and should extend through continuing professional development opportunities. The knowledge, skills and attitudes required for evidence-based practice should be inculcated early and should be a mandatory component of the undergraduate education of health professionals. The EBP education of undergraduate health professionals focuses on curricular development in medicine, nursing and a range of allied health professions. While the Sicily Statement on EBP provides consensus and recommendations about which EBP competencies should be taught in the undergraduate curriculum, there is no certainty about which educational approaches might be the most effective and efficient. 7, 9, 10
2.4 EBP and Physiotherapy education in India

Globally, physiotherapy profession is transiting, moving away from the traditional training of therapeutic skills towards a more practical and functional evidence-based practice.  

Gorgon et al have mentioned in their study that in most of the developed countries education and training of EBP is clearly defined and integrated in entry level courses. Very little is known about the progress and practice of EBP in developing countries where the practice settings and thus education contexts differ from what is already known. Clinical practice settings and healthcare policies determine educational contexts.  

Healthcare policies and systems that determine practice, impact education even in India. Medical tourism is on a rise in India. Raja K have reported that the practice is now autonomous and first hand. With such changes in healthcare delivery system, and autonomy in decision making, it is very important for the curricula to include evidence-based practice.

Physiotherapy education in India has evolved, from a diploma program, like most other health care professions, to the degree and PhD programs. It took 61 years for this remarkable transition to happen. During this time professional educational programs have undergone considerable changes, development and growth.

In India the foundation of Physiotherapy was laid in 1952 following a major epidemic of poliomyelitis in Mumbai. The first school & centre for Physiotherapy was established in Mumbai as a joint collaborative project of Government of India, State Government, & the then Bombay Municipal Corporation (BMC) with technical support from World Health Organization (WHO) in 1953. It was a 2 year Diploma program. The first Bachelors Degree Course (BScPT) of 2 years
duration commenced in 1967 which was first of its kind in the entire South East Asia. This program further advanced to 3 ½ years duration and finally advanced to 4 ½ years BPT course till to date. However the curriculum of this course is diversified due to absence of its central council.

Physiotherapists have tried to get a Central Council since the early days of establishment. Repeated measures were taken by the Indian Association of Physiotherapists to establish separate professional body to look after and govern the physiotherapy education and practice in India.

Since the Central Council for Physiotherapy does not exist in India, physiotherapy education is varied and differs even within the same State. Due to unavailability of definite guidelines given for curriculum formation, the nomenclature, duration of the course, course content, teaching training methods, assessment patterns, allocation of marks differs in each University even within the same State. Such flexibility, if looked at positively, has contributed immensely to the growth of the profession. Educators & academicians had the freedom to incorporate newer subjects, more content and achieve a faster growth for the profession.