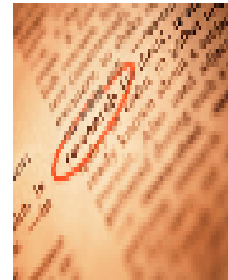


# Research designs and Methods

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## Definition of Research

Research is one of the ways to find answers to your questions using unbiased, valid, and reliable procedures and techniques.



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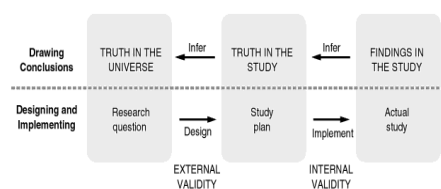


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## The process of research



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## Definition of Research



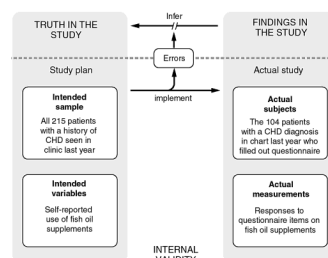
Research is one of the ways to find answers to your questions using unbiased, valid, and reliable procedures and techniques.

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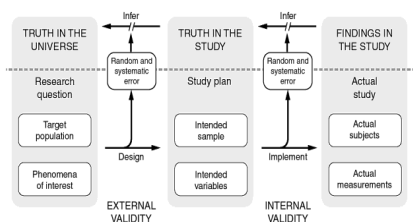
## Implementation errors



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## The research process

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## The Research Process Steps

1. Formulating a research question
2. Conceptualizing a research design
3. Constructing an instrument for data collection
4. Selecting a sample
5. Writing a research proposal
6. Collecting data
7. Processing data
8. Writing a research report

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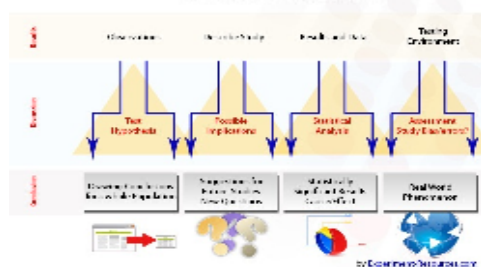


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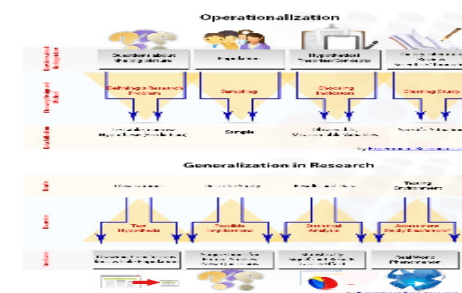
## Generalization in Research



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## What is GOOD research?

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## Novelty and Originality

- Never done before
- Advance our knowledge and understanding

Enough? Anything else?

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## Good research: Generalization

- DNA structure (James Watson & Francis Crick, Nobel Laureate 1962)
  - Genetic code for all living organisms
  - Explain replication and protein synthesis



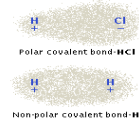
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## Good research: Prediction

- Chemical bonding and forces between molecules (Linus Pauling, Chemistry Nobel Laureate 1954)
  - Predict molecular interactions and chemical reactions



Non-polar covalent bond-H2



Encarta Encyclopedia, Culver Pictures

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## Good research: Wide application

- Polymerase Chain Reaction (Kary Mullis, Nobel Laureate in chemistry 1993 )
  - Make 1 million copies of DNA within hours
  - Wide application in medicine, forensic sciences, molecular.....



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## Good research: Wide application

- Fiber optics (Charles Kao and George Hockham, 1967)
  - Light loss in glass fiber due to scattering and absorption of impurities
  - Lead to the development of silica fiber of speeding up transmission of signals and lowering energy requirements



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## Vital elements of good research

- Originality & Novelty
- Able to make generalization
- Able to make prediction
- Wide application

Ask yourself this question:  
*"How about my own research project?"*

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*Just get out and do it !*

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## The Research Process Steps

1. Formulating a research question
2. Conceptualizing a research design
3. Constructing an instrument for data collection
4. Selecting a sample
5. Writing a research proposal
6. Collecting data
7. Processing data
8. Writing a research report

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## Research questions should guide your:

- Formulation of a Research Rationale & Proposal
- Aims and objectives
- Literature search
- Decisions about:
  - What kind of research strategy & design to employ
  - What data to collect and from whom?
  - How to analyse the data
- Writing up your project (i.e. stop you from going off in unnecessary directions and tangents)

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## The Research Process Steps

1. Formulating a research question
2. Conceptualizing a research design
3. Constructing an instrument for data collection
4. Selecting a sample
5. Writing a research proposal
6. Collecting data
7. Processing data
8. Writing a research report

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- **Methodology:** the general principles of investigation that guide a study. Quantitative , qualitative.
- **Design:** the overall plan and structure of of a piece of research. Operational aspects of the study. E.g. controlled, cohort, case study
- **Methods:** specific techniques employed in execution of a piece of research. E.g. sampling methods, data collection instruments.

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## Types of Research

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## Discovery (Fact findings)

- Which species of fish is most sensitive to cadmium?
- What is the optimal temperature and pH for crystalizing compound A?
- How many compounds are in the seeds and leaves of *Foeniculum vulgare* ?

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Molecules, 2011 Feb 1;16(2):1366-77.

### **Chemical composition, antimicrobial and antioxidant activities of essential oils from organically cultivated fennel cultivars.**

Shahat AA, Ibrahim AY, Hendawy SF, Omer EA, Hammouda FM, Abdel-Rahman FH, Saleh MA.

Department of Phytochemistry, Production of Medicinal and Aromatic Plants, National Research Centre (NRC), 12311 Dokki, Cairo, Egypt.

#### **Abstract**

Essential oils of the fruits of three organically grown cultivars of Egyptian fennel (*Foeniculum vulgare* var. *azoricum*, *Foeniculum vulgare* var. *duice* and *Foeniculum vulgare* var. *vulgare*) were examined for their chemical constituents, antimicrobial and antioxidant activities. Gas chromatography/mass spectrometry analysis of the essential oils revealed the presence of 18 major monoterpenoids in all three cultivars but their percentage in each oil were greatly different. *trans*-Anethole, estragole, fenchone and limonene were highly abundant in all of the examined oils. Antioxidant activities of the essential oils were evaluated using the DPH radical scavenging, lipid peroxidation and metal chelating assays. Essential oils from the *azoricum* and *duice* cultivars were more effective antioxidants than that from the *vulgare* cultivar. Antimicrobial activities of each oil were measured against two species of fungi, two species of Gram negative and two species of Gram positive bacteria. All three cultivars showed similar antimicrobial activity.

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## Technique development

- Lower the detection limit of chemical
- New/more user friendly program for faster calculation
- Improve the resolution of microscope / image recognition/telescope

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*J. Chromatogr. A*, 2008 Aug 22;1202(2):224-8. Epub 2008 Jul 11.

**Optimization of an electrolyte system for analysis of ethambutol in pharmaceutical formulations by capillary zone electrophoresis using complexation with copper(II).**

Faria AF, de Souza MV, Bruns RE, de Oliveira MA  
Departamento de Química, Instituto de Ciências Exatas, Universidade Federal de Juiz de Fora, Cidade Universitária, CEP 36036-330, Juiz de Fora, MG, Brazil

**Abstract**  
An alternative methodology for the determination of ethambutol by capillary zone electrophoresis (CZE) under direct UV detection at 262 nm, using acetic acid/sodium acetate buffer solution (pH 4.6) containing copper(II) sulphate to form the ethambutol-copper(II) complex, within analysis time of 2.5 min is proposed. The optimum CE conditions for the background electrolyte were established performing experiments of a 3 (2) factorial design. Complex formation was evidenced by the UV bathochromic shift and the  $[CuETB](0)$  and  $[CuETB](2+)$  chemical structures were indicated by LC-MS analysis. After some validation parameters have been performed, such as linearity ( $r=0.999$ ), selectivity (comparison between slope of the calibration curve of the external standard and calibration curve of the standard addition), area precision (RSD% <2.13 for ETB and <1.94 for 2A1B), recovery mean (101.7% for ETB and 99.95% for 2A1B) and quantification limit (mg L<sup>-1</sup>): 10.17 for ETB and 19.70 for 2A1B), the method was successfully applied to ETB analysis in pharmaceutical formulation samples. It is possible to determine the presence of the 2A1B impurity at concentrations of less than 1% ETB content.

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## Hypothesis testing

- Drug A reduce blood pressure?
- Chemical A increase the reaction rate ?

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```

graph BT
    Observation[Observation] --> Pattern[Pattern]
    Pattern --> TentativeHypothesis[Tentative Hypothesis]
    TentativeHypothesis --> Theory[Theory]
  
```

**Inductive Reasoning**

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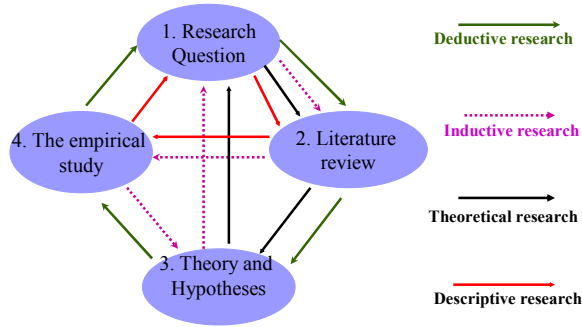
graph TD
    Theory[Theory] --> Hypothesis[Hypothesis]
    Hypothesis --> Observation[Observation]
    Observation --> Confirmation[Confirmation]
  
```

**Deductive Reasoning**

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## Process and Types of Research



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## Research methods

QuaNtitative

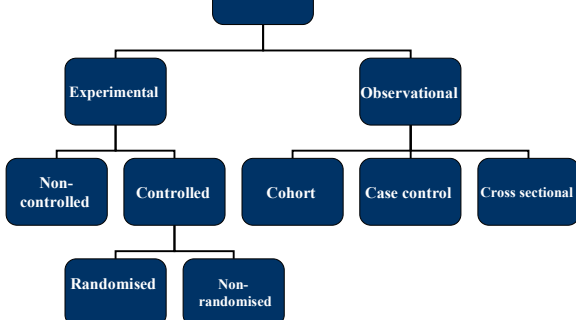
QuaLitative

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## Quantitative



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Pharmacogn Mag. 2010 Oct;5(24):293-7.

### Cytotoxic and growth inhibitory effects of the methanol extract *Struthium sparganophora* Ktze (Asteraceae) leaves.

Ayinde BA, Agbakwuru U.

Department of Pharmacognosy, Faculty of Pharmacy, University of Benin, Benin City, Nigeria.

#### Abstract

**BACKGROUND:** Global research into medicinal plants used in treating tumor-related ailments has become imperative due to the emergence of various forms of cancer diseases. Usually consumed as a vegetable, *Struthium sparganophora* is indicated in traditional herbal medicine as one of the plants used in treating tumor-related ailments.

**MATERIALS AND METHODS:** This claim was examined using bench-top assay methods involving the cytotoxicity of the methanol extract of the leaves to tadpoles of *Ranae ranninus* at 10, 20, 40 and 80 µg/ml. Also, the growth inhibitory effects of the extract on guinea corn radicle at 0.5, 1.0, 2 and 4 mg/ml in addition to evaluation of the phytochemical constituents of the leaves was performed. After 24 h, the crude extract and the chloroform fraction produced the highest cytotoxicity of 96.67 ± 4.71%, each at a concentration of 80 µg/ml, while the aqueous fraction produced 100% cytotoxicity at a concentration of 20 µg/ml.

**RESULTS:** The crude extract had an LC50 of 26 µg/ml, the chloroform fraction had 6.25 while the aqueous fraction had 5 µg/ml. On the inhibition of the guinea corn radicle growth, after 96 h, the controls had an average length of 67.81 ± 2.6 mm, whereas the seeds treated with 4 mg/ml of the crude extract had an average length of 35.83 ± 1.75 mm, indicating 47.81% reduction in length. At the same concentration, the chloroform and the aqueous fractions showed 32.51 and 43.81% inhibitions. The plant material was observed to contain alkaloids, tannins, saponins and flavonoids, with no traces of anthracene derivatives.

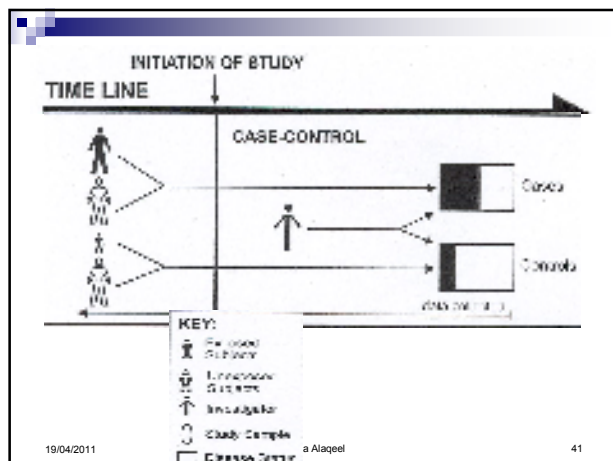
**CONCLUSION:** The results suggest the probable use of the plant in preparing recipes for tumor-related ailments.

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### Sociodemographic and Clinical Factors Associated with Depression in Epilepsy

© 2005 Blackwell Publishing Ltd, *Journal of Internal Medicine* 258: 103–110

<sup>1</sup>Equation (1) of Dwyer (1992) and Dwyer and Brown (1993) is given as follows:

© 2000 John Wiley & Sons, Inc. *Journal of Interpersonal Violence* 15(12): 1301-1311, 2000

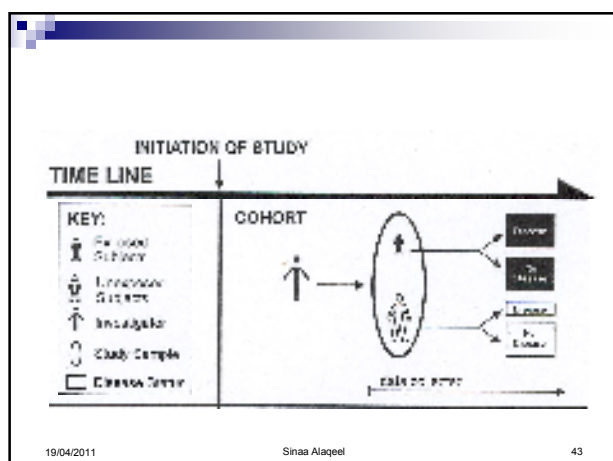
Department of the Interior, Bureau of Land Management

## Abstract

The results of the present study suggest that the use of a single, univariate analysis to assess the relationship of the independent variables to the level of stress may be misleading. Therefore, the use of multivariate analysis in the form of stepwise regression is a more appropriate statistical analysis. The results of the present study indicate that the independent variables that are most strongly associated with the dependent variable are the perceived workload, the amount of time spent on the job, and the amount of time spent on the job. The results of the present study indicate that the independent variables that are most strongly associated with the dependent variable are the perceived workload, the amount of time spent on the job, and the amount of time spent on the job.

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Risk for schizophrenia and schizophrenia-like psychosis among patients with epilepsy: population based cohort study

Tag C.G. Haden St., Thomas Mark Laurson, Norma Wenzel, Freden De Menezes

Altair

Regulation of energy metabolism in a model myocyte, as exemplified by fatty acid metabolism, is centrally linked to signaling related to rate of mitochondrial oxidative phosphorylation, particularly to  $\text{Ca}^{2+}$  and  $\text{O}_2$  homeostasis.

For more information, please contact us at [info@thebigcompany.com](mailto:info@thebigcompany.com).  
The Big Company is a leading provider of business solutions.  
We help you grow your business and improve your productivity.  
Contact us today to learn more about our services.

Wolfsberg, 1998; 1999; 2000; 2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021; 2022; 2023; 2024; 2025; 2026; 2027; 2028; 2029; 2030; 2031; 2032; 2033; 2034; 2035; 2036; 2037; 2038; 2039; 2040; 2041; 2042; 2043; 2044; 2045; 2046; 2047; 2048; 2049; 2050; 2051; 2052; 2053; 2054; 2055; 2056; 2057; 2058; 2059; 2060; 2061; 2062; 2063; 2064; 2065; 2066; 2067; 2068; 2069; 2070; 2071; 2072; 2073; 2074; 2075; 2076; 2077; 2078; 2079; 2080; 2081; 2082; 2083; 2084; 2085; 2086; 2087; 2088; 2089; 2090; 2091; 2092; 2093; 2094; 2095; 2096; 2097; 2098; 2099; 2100; 2101; 2102; 2103; 2104; 2105; 2106; 2107; 2108; 2109; 2110; 2111; 2112; 2113; 2114; 2115; 2116; 2117; 2118; 2119; 2120; 2121; 2122; 2123; 2124; 2125; 2126; 2127; 2128; 2129; 2130; 2131; 2132; 2133; 2134; 2135; 2136; 2137; 2138; 2139; 2140; 2141; 2142; 2143; 2144; 2145; 2146; 2147; 2148; 2149; 2150; 2151; 2152; 2153; 2154; 2155; 2156; 2157; 2158; 2159; 2160; 2161; 2162; 2163; 2164; 2165; 2166; 2167; 2168; 2169; 2170; 2171; 2172; 2173; 2174; 2175; 2176; 2177; 2178; 2179; 2180; 2181; 2182; 2183; 2184; 2185; 2186; 2187; 2188; 2189; 2190; 2191; 2192; 2193; 2194; 2195; 2196; 2197; 2198; 2199; 2200; 2201; 2202; 2203; 2204; 2205; 2206; 2207; 2208; 2209; 2210; 2211; 2212; 2213; 2214; 2215; 2216; 2217; 2218; 2219; 2220; 2221; 2222; 2223; 2224; 2225; 2226; 2227; 2228; 2229; 2230; 2231; 2232; 2233; 2234; 2235; 2236; 2237; 2238; 2239; 2240; 2241; 2242; 2243; 2244; 2245; 2246; 2247; 2248; 2249; 2250; 2251; 2252; 2253; 2254; 2255; 2256; 2257; 2258; 2259; 2260; 2261; 2262; 2263; 2264; 2265; 2266; 2267; 2268; 2269; 2270; 2271; 2272; 2273; 2274; 2275; 2276; 2277; 2278; 2279; 2280; 2281; 2282; 2283; 2284; 2285; 2286; 2287; 2288; 2289; 2290; 2291; 2292; 2293; 2294; 2295; 2296; 2297; 2298; 2299; 2300; 2301; 2302; 2303; 2304; 2305; 2306; 2307; 2308; 2309; 2310; 2311; 2312; 2313; 2314; 2315; 2316; 2317; 2318; 2319; 2320; 2321; 2322; 2323; 2324; 2325; 2326; 2327; 2328; 2329; 2330; 2331; 2332; 2333; 2334; 2335; 2336; 2337; 2338; 2339; 2340; 2341; 2342; 2343; 2344; 2345; 2346; 2347; 2348; 2349; 2350; 2351; 2352; 2353; 2354; 2355; 2356; 2357; 2358; 2359; 2360; 2361; 2362; 2363; 2364; 2365; 2366; 2367; 2368; 2369; 2370; 2371; 2372; 2373; 2374; 2375; 2376; 2377; 2378; 2379; 2380; 2381; 2382; 2383; 2384; 2385; 2386; 2387; 2388; 2389; 2390; 2391; 2392; 2393; 2394; 2395; 2396; 2397; 2398; 2399; 2400; 2401; 2402; 2403; 2404; 2405; 2406; 2407; 2408; 2409; 2410; 2411; 2412; 2413; 2414; 2415; 2416; 2417; 2418; 2419; 2420; 2421; 2422; 2423; 2424; 2425; 2426; 2427; 2428; 2429; 2430; 2431; 2432; 2433; 2434; 2435; 2436; 2437; 2438; 2439; 2440; 2441; 2442; 2443; 2444; 2445; 2446; 2447; 2448; 2449; 2450; 2451; 2452; 2453; 2454; 2455; 2456; 2457; 2458; 2459; 2460; 2461; 2462; 2463; 2464; 2465; 2466; 2467; 2468; 2469; 2470; 2471; 2472; 2473; 2474; 2475; 2476; 2477; 2478; 2479; 2480; 2481; 2482; 2483; 2484; 2485; 2486; 2487; 2488; 2489; 2490; 2491; 2492; 2493; 2494; 2495; 2496; 2497; 2498; 2499; 2500; 2501; 2502; 2503; 2504; 2505; 2506; 2507; 2508; 2509; 2510; 2511; 2512; 2513; 2514; 2515; 2516; 2517; 2518; 2519; 2520; 2521; 2522; 2523; 2524; 2525; 2526; 2527; 2528; 2529; 2530; 2531; 2532; 2533; 2534; 2535; 2536; 2537; 2538; 2539; 2540; 2541; 2542; 2543; 2544; 2545; 2546; 2547; 2548; 2549; 2550; 2551; 2552; 2553; 2554; 2555; 2556; 2557; 2558; 2559; 2560; 2561; 2562; 2563; 2564; 2565; 2566; 2567; 2568; 2569; 2570; 2571; 2572; 2573; 2574; 2575; 2576; 2577; 2578; 2579; 2580; 2581; 2582; 2583; 2584; 2585; 2586; 2587; 2588; 2589; 2590; 2591; 2592; 2593; 2594; 2595; 2596; 2597; 2598; 2599; 2600; 2601; 2602; 2603; 2604; 2605; 2606; 2607; 2608; 2609; 2610; 2611; 2612; 2613; 2614; 2615; 2616; 2617; 2618; 2619; 2620; 2621; 2622; 2623; 2624; 2625; 2626; 2627; 2628; 2629; 2630; 2631; 2632; 2633; 2634; 2635; 2636; 2637; 2638; 2639; 2640; 2641; 2642; 2643; 2644; 2645; 2646; 2647; 2648; 2649; 2650; 2651; 2652; 2653; 2654; 2655; 2656; 2657; 2658; 2659; 2660; 2661; 2662; 2663; 2664; 2665; 2666; 2667; 2668; 2669; 2670; 2671; 2672; 2673; 2674; 2675; 2676; 2677; 2678; 26

doi:10.1017/S0022292414000116

Time for the 10 min. treatment trials did not significantly differ ( $p = 0.15$ ). When confidence intervals were calculated, they overlapped.

<http://www.elsevier.com/locate/jlms>  
<http://www.elsevier.com/locate/jlms>

all the available data. The following hypotheses were tested and the outcomes and the conclusions are briefly discussed.

and the associated financial and sales risk. Finally, sharing of knowledge and information between suppliers, such as product data,

has an increasing number of students of color, and a growing number of students with disabilities.

the effects of epilepsy itself, more and better management  
of seizures, and the ability to make informed decisions.

de la capacidad de los individuos para comprender y utilizar la información de manera crítica y creativa.

provide the most effective way of coping with

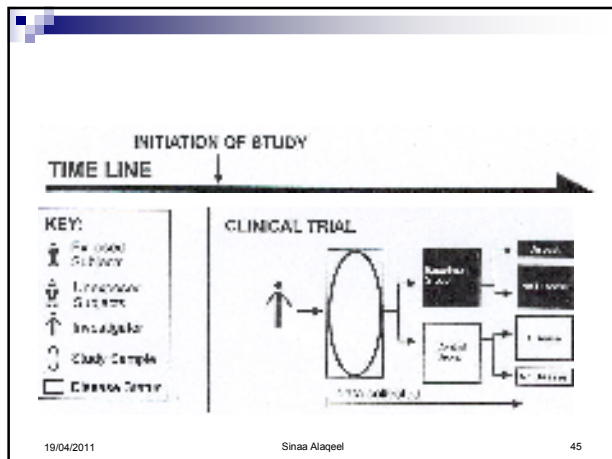
[illegible]

[Back to top](#)

12. *Journal of the American Medical Association*, 1997; 277: 1033-1038.

© 2004 Blackwell Publishing Ltd, *Journal of Internal Medicine* 255: 103–110

1. [Click here](#) to view the full report.



### Side effects of phenobarbital and carbamazepine in childhood epilepsy: randomised controlled trial

**ABSTRACT**

**Objective:** To compare the behavioural side effects associated with two commonly used antiepileptic drugs—the side effects of carbamazepine (CBZ) and phenobarbital (PBZ)—in children with epilepsy.

**Design:** Prospective, randomised controlled trial.

**Setting:** Specialised hospital in Oman.

**Participants:** 33 children aged 5–15 with generalised tonic-clonic seizures (GTCS) on CBZ or PBZ.

**Intervention:** CBZ or PBZ.

**Measurements and Main Results:** CBZ was associated with more behavioural side effects than PBZ.

**Conclusion:** CBZ was associated with more behavioural side effects than PBZ.

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### Secondary drowning in a patient with epilepsy

**Yusuf M. Alkhatib, G. M. Alkhatib**

**ABSTRACT**

**Objective:** To report a case of secondary drowning in a patient with epilepsy.

**Case Report:** A 15-year-old male patient with a history of epilepsy presented with respiratory distress and cyanosis. He was found unconscious in a swimming pool. He was resuscitated and transported to the hospital. He was intubated and ventilated. He was treated with antiepileptic drugs. He was discharged after 72 hours.

**Conclusion:** Secondary drowning is a rare complication of epilepsy. It should be recognized and treated promptly.

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### Association of epilepsy and burns

**A case control study**

**Background:** Epilepsy is a common neurological disorder. Burns are a common cause of injury. The association between epilepsy and burns is not well understood.

**Methods:** A case control study was conducted. The study included 100 patients with epilepsy and 100 patients without epilepsy. The patients were matched for age, sex, and duration of epilepsy.

**Results:** The study found that the incidence of burns was significantly higher in patients with epilepsy than in patients without epilepsy.

**Conclusion:** There is a significant association between epilepsy and burns. The mechanism of this association is not clear.

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Working in groups identify main advantages and disadvantages of research designs discussed during this presentation.....

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Building upon existing evidence to shape future research endeavours

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## Why do literature review???

- Culling the literature
- Know your research databases
- Confirming the need for investigation
- Learning from the mistakes of others
- Common areas for improvement

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## Useful websites

PubMed Tutorial

<http://www.nlm.nih.gov/bsd/disted/pubmed.html>

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