Misliefs and Biases in Health-Related Searches

Motivation

70% of people with Internet access use search engines to search about symptoms, diseases, and treatments [Fox and Duggan, 2013; Finney Rutten et al., 2019] Health misinformation is widespread on the web [Dai et al., 2020]

People tend to believe that alternative medicine helps [Bhattarcharya et al., 2012]

Searchers tend to trust the top-ranked result [Popcacar et al., 2017]

In 2013, more than 50% of search engines’ top answers to medical yes/no questions were incorrect [White, 2013]

Data

1.5 billion questions submitted to Yandex in 2012 Diseases from the ICD codes (more formal, e.g., malignant neoplasm) Wikidata entities subordinate to disease (more colloquial, e.g., cancer) Medical plants from Wikidata and Wikipedia Alternative remedies like honey or leeches from Wikipedia 4,398 disease names; 1,007 plant names; 49 alternative remedies

Yandex Log Analysis

Frequency Disease Frequency Symptom Frequency Cond./State

Yes/No 1,124,402 Vaginal thrush 2,675,642 Fever

142,297 How to get rid of pimples? 143,731 Why does one dream of pregnancy?

190,918 What is a vaginal thrush? 1.2 mln questions contain diseases and

4,398 Pimple

80 K

100 K

120 K

140 K

160 K

Health misinformation is widespread on the web. 

Established belief like “How to drink milk thistle to cure hepatitis?”

Misbelief questions: no scientific evidence that the remedy helps or clinical trials showed the opposite

Search Result Analysis

For 30 frequent questions (15 yes/no and 15 about instructions) Does celandine help with cancer? and How to drink celandine for cancer? Cochrane, PubMed, and BioMed Explorer to find true answer

Annotated top 10 snippets:

Search Result Analysis

Content refers to medicaments or remedies (x)

Answers question yes (no, not clear)

Contains recipe / instructions (not)

No warnings (or there are)

Search Result Analysis

44% positively answer questions with untrue assumptions (i.e., misbeliefs) 6% give a correct ‘no’ answer 17% contain recipes and instructions 13% contain warnings about health risks

32% positively answer questions with untrue assumptions (i.e., misbeliefs) 47% correctly say ’no’ 12% contain recipes and instructions 10% contain warnings about health risks

Does celandine help with cancer? Recipes for treating cancer with celandine…

How to prepare celandine tincture for cancer? How to take celandine tincture for cancer: start with 2 drops … Tincture of an equal amount of celandine, nettle and marigold helps with prostate cancer and metastases. Many folk doctors assure that …

Top 1 snippet answers yes and provides a recipe how to prepare and take No warning that celandine is toxic [Pantano et al., 2017]

Conclusion: Our results strongly suggest that the components of the natural plant protobrine fraction (BBR-F) extracted from C. majus may represent promising novel photosensitive agents and can be applied in cancer photodynamic therapy as natural photosensitizers [Warowicka et al., 2019].


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