BINOMIAL PROBABILITY OF A RARE EVENT IS A KEY FOR SUCCESSFUL PRESCRIPTION OF GENUS EPIDEMICUS

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ABSTRACT

Corona Virus Disease is an overwhelming global pandemic leaving all the world in an exceptional catastrophe. The impact of this crisis is proven encumbrance for public health arrangements across the world. Vaccine is a most sought-after alternative for overcoming this pandemic, but exceedingly time consuming, costly, and inclusive of many unwelcome health hazards. Homeopathy traditionally offers very cost-effective, time saving, simple and speedy solution for overpowering the epidemic. Successful treatment of such epidemics is neither an unprecedented nor isolated event. It has cured many epidemics since the evolution of this therapeutic system for instance cholera, scarlet fever etc. Homoeopathic method of genus epidemicus lacks scientific explanation and reproducibility. The present study attempts to provide a scientific and methodological boost to derive single simple homeopathic remedy which can be prophylactic as well as curative. The current study applied the probability of rare event through binomial probability distribution equation; b(x; n, P) = nCx * Px * (1 – P)n – x. Homoeopathic symptoms were taken from historical (literature reported) cohort. The remedy was analyzed through RADAR 10.0 software. Statistical analysis was carried through MS Excel 2013. After putting the values derived from occurrence of symptoms among patients with COVID, veratrum viridi was the suggestive remedy for given cluster. The remedy was derived from binomial probability of rare event. The cluster taken during this analysis reported vomiting and vomiting and abdominal pain were statistically rare events [Pr (A) <0.05]. Homoeopathic genus epidemic can offer cost effective therapeutic as well as prophylactic alternative among infectious disease epidemics such as COVID19, when scientifically based on certain statistical methods which in turns may bear precise and desired health outcomes.

Key words

Binomial probability, COVID19, Genus epidemicus, Homoeopathy, Rare event

I. INTRODUCTION

Corona Virus disease is defined as an illness caused by (SARS-CoV-2). It was first identified in Wuhan, China. Initially it was reported on 31st December 2019 and WHO declared it as global health emergency and on 11 March 2020 it was declared as global pandemic (Cao, 2020; Velavan and Meyer, 2020). The respiratory illness was the main clinical feature of novel COVID19(Yuki et al., 2020). There are variations in symptoms manifested by this infection across the world. Secondly there is no definite treatment available for this disease either in the form of vaccine or any drug. Complementary and alternative medicines are advocated as an adjuvant alongside conventional therapy(Gemelli Against, 2020). Many antiviral drugs are tried with highly unsatisfied outcomes. Vaccines are under development and minimum time to find access in market after proven safety and efficacy is roughly one year since inception. As on today there are 4,307,287 confirmed cases including 295,101 deaths, reported to WHO(Cao, 2020).
‘Genus Epidemicus’ is the unique conceptual contribution given by Homeopathic philosophy to science of therapeutics(Hahnemann and Schmidt, 2006). Homoeopathic practice conventionally allows the strict individualization of patient for selection of remedy based on characteristic symptoms(Milgrom, 2016; Nair et al., 2014). The prolonged case-taking in homoeopathy is a fundamental methodology to conclude the accurate similar remedy for its judicious administration in humans with certain diseases or disorders(Milgrom, 2018; Mokkapatti, 2018). Epidemic or a pandemic is another unique situation where traditional principles of practice of homoeopathy required being understood in different way than usual framework. Pandemic does not allow exhaustive case taking of every individual owing to its rapid spreading nature and fatal consequences(Parikh et al., 2020). The time for deciding on remedy is too short and demands the utter perfection in its clinical implementation for good universal outcome. Nevertheless, the empirical calculations are not sufficient in such condition and solid evidenced based definitive explanation or rationale is essential to save the lives(Rastogi and Sharma, 1992; Thomas et al., 2018).

Organon of Medicine is a detailed publication for practicing homoeopathy in the real world based on the empirical, experimental, and experienced outcomes of Dr. Samuel Hahnemann who is also the founder of homeopathic science(Hahnemann and Schmidt, 2006). This book contains the guiding principles in the form of aphorisms (§). Certain aphorisms also mention about the genus epidemicus. This exactly means the deriving homoeopathic specific medicine in epidemic to either prevent the spread of disease or treat the disease in aftermath. Aphorism(§) no. 100,101, 102 and 241 guides us about selection of homoeopathic similar and specific remedy for treatment of individual and prophylaxis respectively. The method of selection of homoeopathic medicine in such epidemics as per the homoeopathic philosophy is on outer shell looks very easy and exciting but as you interpret those aphorisms in fathom, it increases the perplexity and make it more complex to execute(Pal and Ningthoujam, 2019). The basic selection of homoeopathic remedy is only on characteristic symptoms without any exception. Deriving a remedy based out of common totality of symptom of prevailing disease does not become the ground for selection of the similar homoeopathic remedy. On the other hand, rapid pace of the epidemic or pandemic disease disallows to actually investigate the characteristic symptoms in individual or a disease cohort. Additionally, the investigator or healthcare provider or physician can only acquire the knowledge of the disease and cases as it evolves. The variation in the interpretation of these aphorisms among expert is a grave challenge leading to high bias and false outcomes. However, if you read those aphorisms especially in unusual interdisciplinary context the §102 which mentions about the symptoms which are peculiar to but few diseases and of ‘rare occurrence’. This is the key word to enter in to real puzzle of selection of genus epidemicus reiterated as rare occurrence. When practically it’s not possible to find out the qualitative symptoms also term as unique, peculiar, characteristic symptoms through exhaustive caretaking as it’s a case in certain pandemics and likelihood of cure of disease based on individualization is very low the real meaning of rare occurrence is the genus epidemicus is based upon statistically rare symptom or symptoms. Whereas the definition of characteristic symptom as per homoeopathic philosophy is rare, unusual, peculiar symptom(Chaudhary and Khurana, 2020), of which the term rare indicated the quantitative variables of definition as opposed to other two qualitative variables(Vaishampayan et al., 2020). You can only find the rarity of the event by measurement. Hence the probability of occurrence of rare event (here it is symptom) is directly related to the likelihood of cure(Ge et al., 2020; Lawrence, 2019).

But the complexity grows as what exactly can be labeled as a rare event. The solution is that a probability threshold needs to be predefined before we can term an event (symptom) to be rare. The medically accepted typical threshold used in statistics is 0.05, so an event will be named as rare if its probability of occurrence is less than 0.05(Budde et al., 2020; Pepelyshev and Zhigljavsky, 2020; Yamaguchi and Maruo, 2019).

Let us take an example of Corona Virus Disease (COVID19) where symptoms include, fever, fatigue, dry cough, anorexia, myalgia, dyspnoea, expectoration, pharyngalgia, dizziness, headache, diarrhoea, nausea, vomiting, and abdominal pain. These symptoms have occurred in different patients with COVID19. Homoeopathy primarily engages with symptom totality for deriving similar homoeopathic medicine, whereas in above case it is difficult to individualize the characteristic symptoms from the common symptom of the disease. The very basis of the prescription is the characteristic symptom and not the common symptom of the disease indeed. Hence the statistically rare event $[Pr \ (A) <0.05]$ or symptom/s among these 14 symptoms qualifies as characteristic symptom. Thus remedy selected thereon will be the model genus epidemicus for preventing or treating COVID19 patients(Duke et al., 2017; Hasan et al., 2020).
II. METHODS
The probabilities of a rare event can simply checking if it is less than predetermined threshold, in our case it is 0.05. A binomial probability is a best possible solution to find out the genus epidemicus to treat the current pandemic of COVID19. We have already elaborated previously about the genus epidemicus and how homeopathic similar remedy is traditionally been derived for prevention and treatment of the disease. Binomial probability distributions assist us to know the probability of rare events and to set likely estimated ranges. It is especially valuable in illustrating the probability of successes or failures from a given number of events (n). For further explanation consider a data from Wang et al. (2020) study to explain the statistical process of deriving genus epidemicus based upon statistically rare symptom through binomial probability (Wang et al., 2020).

The data from Wang et al., mentions about the 14 symptoms reported in 138 patients with COVID19 who either required intensive care unit or not during the entire illness (Ge et al., 2020). The number of patients suffered from respective symptoms are as following, fever (136/138), fatigue (96/138), dry cough (82/138), anorexia (55/138), myalgia (48/138), dyspnoea (43/138), expectoration (37/138), pharyngalgia (24/138), dizziness (13/138), headache (9/138), diarrhea (14/138), nausea (14/138), vomiting (5/138), and abdominal pain (3/138).

From the above data, we could calculate the binomial probability for the occurrence of rare event or here in this case precisely a symptom of abdominal pain and vomiting among 14 other symptoms in 138 patients with COVID19 individually.

The formula for binomial distribution is:
\[ b(x; n, P) = \binom{n}{x} \cdot P^x \cdot (1 – P)^{n-x} \]

Where:
b = binomial probability
\( x \) = total number of “successes”
P = probability of a success on an individual trial
n = number of trials

III. RESULTS
After putting the values from data of Wang et al., [where, \( x =3 \), \( n=138 \) and \( P = 0.07 \)] in the above given formula to find binomial probability we got \( P(X=x) \) as 0.008 for the symptom of abdominal pain and [where, \( x =5 \), \( n=138 \) and \( P = 0.07 \)] the binomial probability \( P(X=x) \) as 0.041 from the symptom of vomiting. We had already predefined the probability threshold as 0.05, thus abdominal pain and vomiting were qualified as rare symptoms or events among 14 other symptoms. So, when we further analyzed and evaluated the symptoms through ‘Synthesis’ repertory especially for statistically rare symptoms which were abdominal pain and vomiting was as followed, A rubric “Abdomen>Pain>Pneumonia in”; was unavailable in repertories even after cross-repertorization. But the rubric, “Chest>Inflammation>Lungs>accompanied by> vomiting” and cross-reference, “stomach-vomiting-accompanied by-pneumonia” when repertorized from Synthesis repertory, only two remedies were enlisted in front of the rubric which were, apomorphinum hydrochloricum and veratrum viride. When further investigated with the help of Boericke’s materia medica, the pain in abdomen and stomach both were covered under the remedy veratrum viride alongside vomiting during pneumonia which apomorphinum did not have.

IV. DISCUSSION
Homoeopathic concept of genus epidemicus was an exclusive contribution of Dr. S. Hahnemann to the therapeutic world (Hahnemann and Schmidt, 2006). The basic foundation of homoeopathic philosophy such as individualization make it impossible to manage the large cases of infections from same causative organism especially in circumstances such as global pandemics (Parikh et al., 2020; Rastogi and Sharma, 1992; Thomas et al., 2018). Despite of choosing a traditional method of remedy selection the new alternative is reported while treating major epidemics or pandemics (Pal and Ningthoujam, 2019). The interpretation of the methodology suggested nearly two decades back must be taken in the context of mathematics or statistics in order to be relevant and developing a real-time application (Vaishampayan et al., 2020).
The above discourse is an attempt to solve the real-world application of homoeopathic philosophy and concept of genus epidemicus in the COVID pandemic. Mere symptom similarity may not be sufficient this time to conclude the broad-spectrum remedy which can be applied to most of the population either to prevent or treat a disease (COVID19). The binomial probability may offer some explanation towards simplifying the process of calculating or deriving genus epidemicus. There can be many other methods in mathematics as well as statistics which could be unfolded after detailed study (Jiang and Fu, 2018; Mathie et al., 2013; Yang, 2021). This study attempts to provide an insight to a different scientific approach to the concept of genus epidemicus besides its traditional interpretation. There is lot of variation in clinical presentation as well as severity of symptoms of COVID across the globe. Therefore cluster sampling may be useful while drawing a genus epidemicus either for purpose of prevention or treatment.

Veratrum Viride is powerful respiratory poison producing asphyxia in its pathogenesis. The vomiting is a symptom which occurs in classically rare number of patients according to data available for COVID 19. Applying the binomial probability for rarity of the event and unique rare peculiar and characteristic symptom, the vomiting during pneumonia from veratrum viridi qualifies the condition. Additionally, Veratrum Viridi also acts on the vasculature (arteries) of the lungs, which also resembles a pathogenesis similar to COVID pneumonia.

Binomial Probability to find a rarity of event is a known statistical method. When symptoms occur very infrequently, as is sometimes the case for vomiting in pneumonia, the number of patients observed with vomiting event could be approximately Poisson distributed. Therefore, abinomial probability analysis offers a crucial solution herein terms of near specific genus epidemicus.

V. CONCLUSION

Binomial probability can be possible scientific and precise method for deducing genus epidemicus but more samples required to be studied to support this methodology for its universal application. As the characteristics (here in case, symptoms) of the sample derived from COVID population varies region to region, the remedy veratrum viridi derived during the discourse is only suggestive and may not be applicable in all scenarios. More cluster specific study is warranted.

Conflict of Interest

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