Original Article

Relationship between Clinical Trials and Disease Burden of India: A Cross-sectional Study

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Introduction

India is one of the preferred destinations for conducting clinical trials. Conducting trials in India is economically feasible in addition to other favorable factors such as the availability of a large, ethnically diverse and therapy-naive patients, and the availability of many qualified English-speaking investigators.[1] The enrollment rate of clinical trials in India is better compared to many other countries.[1] Around 8950 clinical trials are registered in the newly launched Clinical Trial Registry of India (CTRI) till 30th June 2017, and are expected to further increase due to current relaxation of the norms for the conduct of clinical trials in India.[2] Interventions against many diseases are being explored in these clinical trials, and not only allopathic interventions but also AYUSH (Ayurveda, yoga, Unani, Siddha, homoeopathy) interventions are used for various acute and chronic diseases.[2,3]

Background: Research output/efforts in a country should be reflective of the disease burden. India is a site for several national and multinational clinical trials. However, whether clinical trials performed in India reflect the disease burden is not well known. Objectives: The aim of this study was to evaluate the relationship between disease burden and clinical trials performed in India. Materials and Methods: We extracted data on the disease burden from the World Health Organization (WHO) website and on characteristics of clinical trials performed in India from the Clinical Trial Registry of India (CTRI). The correlation between disease burden parameters of overall mortality, disability-adjusted life years (DALYs), years lost due to disability (YLD) and years of life lost (YLL), and the frequency of clinical trials associated with a particular disease was assessed. Additional subgroup analysis according to the number of trial centers, study phase, and medicine type was also performed. Results: Only 18% of clinical trials addressed top 10 diseases associated with 68.3% of overall mortality, and 8% of clinical trials addressed top 10 diseases associated with 52.3% of DALYs. Similarly, 16% of clinical trials addressed top 10 diseases associated with 52.3% of YLDs. Furthermore, top 10 diseases associated with 65.9% of YLLs were addressed in only 8% of ongoing clinical trials. The overall correlation between any disease burden parameters with the diseases being explored in clinical trials was poor. Conclusion: There is a mismatch between diseases for which clinical trials are happening in the India and the disease burden of India. Measures need to be taken to fulfill this gap between demand and need.

Keywords: Clinical trials, disability, disease-adjusted life years, disease burden, India, mortality

Received: 12-09-2019. Accepted: 06-04-2020. Published: 18-07-2020.
As per the Declaration of Helsinki, the agenda of research in a geographical area should match with the disease burden of that area. Accordingly, clinical trials performed in India should match the disease most prevalent in India.\textsuperscript{[4]} Previous studies addressing the association between disease burden and clinical trials have reported a mismatch.\textsuperscript{[5]} However, whether the clinical trials performed in India address the local disease burden has not been assessed empirically.

India shares one-fifth of the global burden of the disease. To address the disease burden, there is an urgent need for new interventions for prevention and treatment of these diseases through clinical trials. This would be very logical that clinical trials conducted in India should be for the diseases prevalent in the country so that the participation of subjects in these clinical trials can be justified.\textsuperscript{[6]} A systematic and empirical assessment of the relationship between disease burden and clinical trials performed in India has not been performed. Hence, this study was designed to assess whether clinical trials conducted in India correlate with the local disease burden.

**MATERIALS AND METHODS**

**Study design and setting**

We performed this study based on publically available data of disease burden and clinical trials registered in the CTRI. This study was conducted at the Department of Pharmacology, All India Institute of Medical Sciences, Jodhpur, Rajasthan, India.

**Data sources**

Any clinical trial involving human subjects performed in India involving drug regardless of the phase of the study or form of medicine (allopathic, unani, etc.) was eligible for inclusion. Any observational study or studies involving animals were not eligible for inclusion. Data related to all clinical trials registered in India were extracted from the CTRI (http://ctri.nic.in/ClinicalTrials/login.php), from it is inception in the year 2007 to the year 2014. CTRI registers clinical trials associated with all forms of medicine, including trials of allopathic, Ayurveda, yoga, unani, Siddha, and homeopathic medicine. Data related to the burden of diseases in India were extracted from the website of the World Health Organization (WHO) (http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html).

**Data extraction**

Data on therapeutic area of the study, study design (clinical trial, observational study, or thesis), funding source, the field of medicine (allopathic or other), and phase of the trial were extracted. From the burden of the disease database, data on mortality, disability-adjusted life year (DALY), years lost due to disability (YLD), and years of life lost (YLL) were extracted [Figure 1]. The trials involving the surgical trials, cosmetics, and anesthesia were excluded from the study as they could not be classified into any WHO disease burden category. Different therapeutic areas of the trials were reclassified into the classification of the global burden of disease before analysis.

**Data analysis**

Descriptive statistics in the form of frequency and percentages was used to summarize categorical data. Nonparametric Spearman's correlation test was used to assess the relationship between parameters of disease burden with the frequency of trials. Statistical Package for the Social Sciences (SPSS) software, version 17.0 (SPSS, Chicago, Illinois) was used for the analysis.

**RESULTS**

**Characteristics of the trials included in the analysis**

A search of the CTRI database yielded 5087 studies, of which 639 were not eligible for inclusion for the reasons shown in Figure 1. Briefly, 516 were observational

![Flow diagram illustrating the selection process of included studies](image-url)
studies, and for an additional 123 studies, a determination on the type of study could not be made, resulting in a total of 4448 clinical trials for further review [Table 1]. An additional 520 studies had no data on disease category and therefore were excluded from the analysis. The final number of studies included for analysis was 3928.

A total of 3928 trials were further classified based on the intervention type (allopathic and AYUSH). For intervention type, 3683 trials were used for analysis, as for 245 (6.65%) trials, the intervention type could not be determined. Of these, 2678 (72.71%) trials involved allopathic intervention, and 460 (12.48%) had AYUSH intervention. The analysis was also performed by classifying the trials based on the sponsor type (pharmaceutical versus others). For sponsor type, for 531 trials, the sponsorship could not be determined, resulting in a total of 3397 trials for the final analysis. The pharmaceutical companies conducted 2460 (58.5%) trials, and 1743 (41.5%) were conducted by others [Figure 1].

Data related to the disease burden of India

According to the WHO data, top 10 major disease categories contributing to mortality in India were cardiovascular diseases (25.89%), infectious and parasitic diseases (13.76%), injury (11.06%), respiratory diseases (10.87%), malignant neoplasms (8.09%), respiratory infections (6.80%), neonatal conditions (6.30%), digestive diseases (5.26%), genitourinary diseases (3.12%), and diabetes mellitus (3.08%).

Top 10 major disease categories for DALY were infectious and parasitic diseases (13.61%), cardiovascular diseases (13.5%), injury (11.58%), neonatal conditions (11.3%), respiratory diseases (5.71%), mental and behavioral disorders (5.46%), respiratory infections (5.42%), malignant neoplasms (5.25%), digestive diseases (4.22%), and nutritional deficiencies (4.09%), whereas top 10 disease categories contributing to YLD were mental and behavioral disorders (18.92%), musculoskeletal diseases (13.21%), nutritional deficiencies (12.81%), sense organ diseases (11.10%), neurological conditions (6.57%), infectious parasitic diseases (5.54%), injury (5.42%), respiratory diseases (4.66%), diabetes mellitus (3.43%), and genitourinary diseases (3.23%).

In the case of YLL, top 10 disease categories were cardiovascular diseases (17.91%), infectious parasitic diseases (16.62%), neonatal conditions (14.90%), injuries (13.91%), respiratory infections (7.13%), malignant neoplasms (7.08%), respiratory diseases (6.10%), digestive diseases (5.06%), congenital anomalies (2.81%), and genitourinary diseases (2.42%).

Comparison of the therapeutic area of clinical trials with the disease burden

Mortality

Top 10 diseases leading to high mortality in India as per WHO disease burden statistics were ischemic heart disease (15.1%), injuries (11.1%), chronic obstructive pulmonary disease (9.4%), stroke (7.3%), lower respiratory infection (6.8%), tuberculosis (4.9%), diarrheal diseases (4.5%), preterm birth complications (3.5%), diabetes mellitus (3.1%), and kidney diseases (2.7%). In total, 68.3% of deaths were due to these diseases. The clinical trials that were registered for these diseases were only 18.0% [Table 2]. A statistically significant moderate correlation was observed between

| Parameter | Frequency (%) |
|-----------|---------------|
| 1 Year    |               |
| 2007      | 27 (0.7)      |
| 2008      | 128 (3.3)     |
| 2009      | 526 (13.4)    |
| 2010      | 589 (15.0)    |
| 2011      | 616 (15.7)    |
| 2012      | 759 (19.3)    |
| 2013      | 679 (17.3)    |
| 2014      | 604 (15.4)    |
| 2 Type of volunteers |          |
| Healthy human volunteers | 444 (11.3) |
| Patients  | 3434 (87.4)   |
| Nonclassified | 50 (1.3)     |
| 3 Phase of trial |          |
| Phase I   | 129 (3.3)     |
| Phase I/Phase II | 86 (2.2)   |
| Phase II  | 586 (14.9)    |
| Phase II/Phase III | 146 (3.7)  |
| Phase III | 1246 (31.7)   |
| Phase III/Phase IV | 89 (2.3)    |
| Phase IV  | 660 (16.8)    |
| Nonclassified | 986 (25.1)  |
| 4 Type of study |          |
| BA/BE     | 91 (2.3)      |
| Intervention | 3648 (92.9) |
| PMS       | 189 (4.8)     |
| 5 Site of study |        |
| India     | 3301 (84.0)   |
| International | 627 (26.0)  |
| 6 Sponsor |              |
| Company   | 2183 (55.6)   |
| Others    | 1482 (37.7)   |
| Unclassified | 263 (6.7)   |
| 7 Type of intervention |        |
| AYUSH     | 472 (11.99)   |
| Drug      | 2925 (74.38)  |
| Unclassified | 531 (13.48)  |

Values in parenthesis are percentages

Table 1: Characteristics of clinical trials included in the analysis
the causes of mortality and therapeutic area of trials included in the analysis \((r = 0.429, P = 0.047)\).

A statistically nonsignificant and weak correlation was observed between causes of mortality and bioavailability bioequivalence (BA/BE) trials \((r = 0.052, P = 0.819)\), moderate and significant correlation between the causes of mortality and interventional trials \((r = 0.449, P = 0.036)\), and nonsignificant and weak correlation between the causes of mortality and post-marketing surveillance (PMS) trials \((r = 0.365, P = 0.095)\). Except for a Phase II/III clinical trial, which has a significant correlation, all other phases of trials had a nonsignificant correlation with mortality [Table 3].

A significant moderate correlation was observed in the case of comparison of therapeutic area of allopathic trial with causes of mortality \((r = 0.486, P = 0.022)\), whereas in the case of AYUSH trials, a very weak and nonsignificant correlation was observed with the causes of mortality \((r = 0.117, P = 0.603)\). A significant moderate correlation was observed for the therapeutic area of pharmaceutical company funded trials \((r = 0.458, P = 0.032)\) and trials funded by other agencies \((r = 0.482, P = 0.023)\) with the causes of mortality.

Disability-adjusted life years

Top 10 diseases associated with high disability-adjusted life years (DALY) in India as per WHO disease burden statistics were injuries (11.6%), ischemic heart disease (7.8%), preterm birth complications (6.1%), lower respiratory infections (5.2%), chronic obstructive pulmonary disease (4.4%), diarrheal diseases (4.1%), tuberculosis (3.7%), stroke (3.6%), iron-deficiency anemia (3.2%), and cirrhosis of liver (2.1%). These top 10 diseases accounted for 52.3% of the total DALYs but only 8.09% of the total trials were conducted in these areas [Table 4]. A statistically nonsignificant weak correlation was observed between the causes of DALY and the therapeutic area of total interventional trials registered on CTRI \((r = 0.382, P = 0.079)\).

A statistically nonsignificant and weak correlation was observed between causes of DALY and BA/BE trials \((r = 0.215, P = 0.336)\), moderate and nonsignificant correlation between causes of DALY and interventional trials \((r = -0.412, P = 0.057)\), and nonsignificant and weak correlation between causes of DALY and PMS trials \((r = 0.317, P = 0.151)\). Except for Phase I and Phase III/IV clinical trials, which have significant moderate correlation, other phase of trials has no significant correlation with DALYs [Table 3].

A statistically significant moderate correlation was observed in the case of comparison of therapeutic care of allopathic trials with the causes of DALYs \((r = 0.425, P = 0.049)\), whereas in the case of AYUSH trial, the correlation with the causes of DALYs was weak and nonsignificant \((r = 0.103, P = 0.650)\). A moderate and significant correlation was observed for the therapeutic area of pharmaceutical company funded trials with the causes of DALYs \((r = 0.424, P = 0.049)\), whereas in the case of non-pharmaceutical company funded trials, this correlation was weak and nonsignificant \((r = 0.379, P = 0.082)\).

Years lost due to disability

Top 10 diseases associated with YLD were iron-deficiency anemia (11.2%), depressive disorders (9.1%), other musculoskeletal disorders (5.9%), back and neck pain (5.5%), injuries (5.4%), migraine (4.3%), uncorrected refractory errors (3.9%), other hearing loss (3.8%), diabetes mellitus (3.4%), and skin diseases (2.6%). These diseases were 53.2% of the total YLDs,

| S. no | Diseases                        | Mortality (Years lost due to disability) | Trial frequency | Pharma trials | Non-pharma trials | AYUSH trials | Allopathic trials |
|-------|---------------------------------|------------------------------------------|-----------------|--------------|------------------|--------------|-------------------|
| 1     | Ischemic heart disease          | 1446.85 (15.1) | 83 (2.11) | 55 (1.50) | 20 (0.55) | 3 (0.09) | 76 (2.24) |
| 2     | Injuries                        | 1057.10 (11.1) | 14 (0.36) | 7 (0.19) | 6 (0.16) | 0 (0.0) | 11 (0.32) |
| 3     | Chronic obstructive pneumonia   | 896.78 (9.4) | 52 (1.32) | 36 (0.98) | 14 (0.38) | 2 (0.06) | 47 (1.38) |
| 4     | Stroke                          | 694.26 (7.3) | 16 (0.40) | 6 (0.16) | 2 (0.05) | 0 (0.0) | 7 (0.21) |
| 5     | Lower respiratory infections    | 648.22 (6.8) | 15 (0.40) | 9 (0.25) | 6 (0.16) | 0 (0.0) | 15 (0.44) |
| 6     | Tuberculosis                    | 470.64 (4.9) | 27 (0.69) | 6 (0.16) | 20 (0.55) | 2 (0.06) | 24 (0.71) |
| 7     | Diarrheal diseases              | 431.18 (4.5) | 44 (1.12) | 26 (0.71) | 15 (0.41) | 4 (0.12) | 39 (1.15) |
| 8     | Preterm birth complications     | 329.86 (3.5) | 22 (0.56) | 0 (0.0) | 8 (0.22) | 0 (0.0) | 9 (0.26) |
| 9     | Diabetes mellitus               | 298.24 (3.1) | 378 (9.62) | 261 (7.12) | 93 (2.54) | 61 (1.80) | 282 (8.30) |
| 10    | Kidney diseases                 | 257.86 (2.7) | 56 (1.43) | 31 (0.85) | 23 (0.63) | 3 (0.09) | 50 (1.47) |

Values in parenthesis are percentages
whereas the clinical trials registered for these areas were only 15.76% of the total [Table 5]. A statistically nonsignificant weak correlation was observed between the causes of YLD and therapeutic area of trials ($r = 0.349, P = 0.111$).

A statistically significant and moderate correlation was observed between the causes of YLD and BA/BE trials ($r = 0.452, P = 0.035$), weak and nonsignificant correlation between the causes of YLD and interventional trials ($r = 0.373, P = 0.088$), and significant and moderate correlation between the causes of YLD and PMS trials ($r = 0.431, P = 0.045$). There was a moderate and significant correlation observed between Phase II trials and disease burden ($r = 0.473, P = 0.026$). No significant correlation was observed between any other phases of trials with the YLD burden [Table 3].

A weak and nonsignificant correlation was observed between the therapeutic area of allopathic trials and causes of YLDs ($r = 0.337, P = 0.126$), whereas between the therapeutic area of AYUSH trials and causes of YLD, the correlation was moderate and significant ($r = 0.495, P = 0.019$). Correlation between the therapeutic area of pharmaceutical company funded trials ($r = 0.393, P = 0.070$) and non-pharmaceutical company funded trials ($r = 0.239, P = 0.283$) with causes of YLDs was weak and nonsignificant.

### Years of life lost

Top 10 diseases associated with YLL were injuries (13.9%), ischemic heart diseases (10.4%), preterm birth complications (8.2%), lower respiratory infections (7.1%), diarrheal diseases (5.3%), chronic obstructive pulmonary disease (5.1%), tuberculosis (4.8%), stroke (4.7), birth asphyxia and birth trauma (3.4%), and cirrhosis of the liver (2.9%). These diseases account for 65.9% of the total YLLs, whereas the clinical trials registered for these areas were only 7.79% of the total [Table 6]. A statistically nonsignificant and weak

| Table 3: Correlations between disease burden and various characteristics of trials |
|-----------------------------------------------|-----------------|-----------------|
| Parameter | Correlation coefficient | P value |
| Mortality |                                |            |
| 1 | Mortality-Phase I | 0.412 | 0.057 |
| 2 | Mortality-Phase I/II | 0.384 | 0.077 |
| 3 | Mortality-Phase II | 0.404 | 0.062 |
| 4 | Mortality-Phase II/III | 0.515 | 0.014 |
| 5 | Mortality-Phase III | 0.399 | 0.066 |
| 6 | Mortality-Phase III/IV | 0.395 | 0.069 |
| 7 | Mortality-Phase IV | 0.405 | 0.061 |
| DALY |                                |            |
| 1 | DALY-Phase I | 0.447 | 0.037 |
| 2 | DALY-Phase I/II | 0.271 | 0.223 |
| 3 | DALY-Phase II | 0.404 | 0.062 |
| 4 | DALY-Phase II/III | 0.321 | 0.145 |
| 5 | DALY-Phase III | 0.351 | 0.110 |
| 6 | DALY-Phase III/IV | 0.434 | 0.044 |
| 7 | DALY-Phase IV | 0.288 | 0.194 |
| YLD |                                |            |
| 1 | YLD-Phase I | 0.226 | 0.232 |
| 2 | YLD-Phase I/II | 0.269 | 0.226 |
| 3 | YLD-Phase II | 0.473 | 0.026 |
| 4 | YLD-Phase II/III | 0.248 | 0.266 |
| 5 | YLD-Phase III | 0.369 | 0.091 |
| 6 | YLD-Phase III/IV | 0.413 | 0.056 |
| 7 | YLD-Phase IV | 0.323 | 0.143 |
| YLL |                                |            |
| 1 | YLL-Phase I | 0.338 | 0.124 |
| 2 | YLL-Phase I/II | 0.257 | 0.248 |
| 3 | YLL-Phase II | 0.289 | 0.193 |
| 4 | YLL-Phase II/III | 0.423 | 0.050 |
| 5 | YLL-Phase III | 0.281 | 0.205 |
| 6 | YLL-Phase III/IV | 0.316 | 0.152 |
| 7 | YLL-Phase IV | 0.291 | 0.189 |
correlation was observed between causes of YLL and therapeutic area of trials ($r = 0.327$, $P = 0.138$).

A statistically nonsignificant, negative, and weak correlation was observed between the causes of YLL and BA/BE trials ($r = -0.052$, $P = 0.819$), weak and nonsignificant correlation between causes of YLL and interventional trials ($r = 0.348$, $P = 0.112$) and PMS trials ($r = 0.251$, $P = 0.259$). Except for Phase II/III clinical trials, which have significant and moderate correlation ($r = 0.423$, $P = 0.050$), no other phases have any significant correlation with the YLL [Table 3].

A weak and nonsignificant correlation was observed between the therapeutic area of alopathic trials and causes of YLLs. Correlation between the therapeutic area of pharmaceutical company funded trials and causes of YLLs was weak and nonsignificant ($r = 0.340$, $P = 0.121$), whereas in the case of non-pharmaceutical company funded trials, the correlation was moderate and significant ($r = 0.426$, $P = 0.048$).

**DISCUSSION**

The findings from our study show a weak correlation between disease burden parameters and the diseases for which clinical trials are being conducted in India. That is, there is a significant mismatch between disease burden and clinical trials for the top 10 diseases responsible for the disease burden. Furthermore, the mismatch was prevalent across all medicine types, which was evident in the various subgroup analyses according to allopathy versus AYUSH trials or national versus multinational trials, and so on.

The findings observed in our study are in line with other studies performed in a similar setting. For example, a study by Viergever et al.\(^5\) assessed 5% of clinical trials from the WHO’s International Clinical Trials Registry Platform and found that in general, diseases prevalent in lower-income countries receive much lesser attention than higher-income countries. Similarly, another study by Bourgeois et al.\(^7\) assessing the association between pediatric clinical trials and global burden of disease, also reported a poor association and mismatch.
between clinical trials and disease burden in low-income countries. In contrast, a study by Lam et al.\(^8\) from Australia, assessing the clinical trial activity and disease burden, reported sync between clinical trials and disease burden. Nevertheless, it is also important to consider the paucity of data on the issue of mismatch between clinical trials and disease burden. In short, it appears that there is a significant mismatch between clinical trials and the disease burden, specifically in low-income countries.

There might be several factors associated with this mismatch. However, a systematic assessment of the factors associated with the mismatch is not well studied. We suspect that this mismatch may be most likely attributed to the influence of market forces and lack of government initiatives or support for drug development. For example, most clinical trials in our cohort were privately funded (58.5%), and the potential for revenue generation may play an important role in informing the decision to pursue a clinical trial versus the disease burden. In addition, the government of India spends only 1.3% of the gross domestic product (GDP) on health care, which is significantly lower compared to other countries, and possibly one of the reasons for the larger share of pharmaceutical industry in clinical trials.\(^9\)

Majority of clinical trials performed in India are Phase II and Phase III trials. As per Schedule Y regulation for clinical trials in India, for molecules developed in India, a Phase I trial should be performed mandatorily in India, and for molecules developed elsewhere the regulatory agency may permit direct Phase II trial.\(^10\) Findings from our study showing only 3.3% trials were Phase I trials, which indicate that new molecule development in India is rare, and majority of interventions/drugs, which are being explored through the clinical trials, are discovered in countries other than India.\(^11,12\) Therefore, it is apparent that molecules developed in other countries will address the disease burden of that country and not India, which may be the key factor associated with the mismatch between disease burden and diseases explored in clinical trials in India.\(^11,12\) In summary, mismatch between disease burden and clinical trials in India exists and needs systematic assessment of factors associated with the mismatch.

Another surprising finding from our study is the mismatch between trials assessing the efficacy of drugs, involving AYUSH medicine, and disease burden. We suspect the lack of uptake among the population for AYUSH forms of medicine compared with allopathic medicine. A recent survey assessing the use of AYUSH in the general population in India reported only 30% of the population using AYUSH. The variation in the use of AYUSH was large, which ranged between 3% and 54%. However, despite the relatively low usage of AYUSH and creation of AYUSH ministry, in absolute terms, even the lowest usage of 3% translates into a large number of patients due to a population of over one billion. Therefore, the possibility of AYUSH forms of medicine being used by patients without systematic assessment is indeed concerning and our findings should also inform the priority areas for AYUSH research along with an assessment of reasons for the mismatch between trials and disease burden.

The study had few limitations as well. We used the publicly available data from the CTRI, which is a dynamic registry that is constantly updated. Therefore, the study may have potentially missed some recent studies. However, we do not expect a significant shift due to the lack of any major changes in the policy or market in the context of India. Another issue may be related to missing information for a few trials, which had to be excluded as we could not code the information. Nevertheless, the missing information applies to a

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**Table 6: Comparison of years of life lost with trials registered in top 10 diseases category**

| S. no. | Diseases                        | YLLs          | Trial frequency | Pharma trials | Non-pharma trials | AYUSH trials | Allopathic trials |
|-------|---------------------------------|---------------|----------------|---------------|-------------------|--------------|------------------|
|       |                                 |               |                |               |                   |              |                  |
| 1     | Injuries                        | 51695.45 (13.9)| 14 (0.36)      | 7 (0.19)      | 6                 | 0 (0.0)      | 11 (0.32)        |
| 2     | Ischemic heart disease          | 38726.23 (10.4)| 83 (2.11)      | 55 (1.50)     | 20                | 3 (0.08)     | 76 (2.24)        |
| 3     | Preterm birth complications     | 30312.35 (8.2) | 22 (0.56)      | 0 (0.0)       | 8                 | 0 (0.0)      | 9 (0.26)         |
| 4     | Lower respiratory infections    | 26414.48 (7.1) | 15 (0.41)      | 9 (0.25)      | 6                 | 0 (0.0)      | 15 (0.44)        |
| 5     | Diarrheal diseases              | 19796.39 (5.3) | 44 (1.12)      | 26 (0.71)     | 15                | 4 (0.11)     | 39 (1.15)        |
| 6     | Chronic obstructive pulmonary disease | 18868.77 (5.1) | 52 (1.32)      | 36 (0.98)     | 14                | 2 (0.05)     | 47 (1.38)        |
| 7     | Tuberculosis                    | 17868.53 (4.8) | 27 (0.69)      | 6 (0.16)      | 20                | 2 (0.05)     | 24 (0.71)        |
| 8     | Stroke                          | 17639.36 (4.7) | 16 (0.41)      | 6 (0.16)      | 2                 | 0 (0.0)      | 7 (0.21)         |
| 9     | Birth asphyxia and birth trauma | 12658.16 (3.4)| 11 (0.28)      | 0 (0.0)       | 10                | 0 (0.0)      | 9 (0.26)         |
| 10    | Cirrhosis of the liver          | 10795.59 (2.9) | 21 (0.53)      | 6 (0.16)      | 12                | 2 (0.05)     | 18 (0.53)        |

Values in parenthesis are percentages.
very small proportion of studies and therefore is not expected to significantly impact the overall findings. Despite the limitation, which is essentially beyond the control of investigators, the findings represent the largest study assessing the correlation between disease burden and conducted trials in India.

In conclusion, the findings from our study show a mismatch between disease burden and diseases explored in clinical trials in India. Further studies are needed to explore the reasons for the mismatch and also inform the research priority setting to address the disease burden to ultimately improve the overall patient care in India.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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