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Methodological Challenges in Estimation of the Life Time Prevalence of Alcohol Consumption in Iran: Current Practice and Guidelines for Futures Studies

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Abstract

Background: The prevalence of alcohol consumption in Iran cannot be estimated because large variations have been observed in the reported prevalences of alcohol consumption. The main aim of this study was to assess the methodological challenges in estimation of the life time prevalence of alcohol consumed in Iran. By the same token we provided a standard approach for future researches in this regard.

Methods: Published articles were reviewed systematically. Using the risk of bias tool, 49 out of 600 articles met the eligibility criteria. Based on the population of alcohol consumers, the included studies were categorized into 5 groups: general populations, patients, school students, university students, and specific population (first relatives of opium addicts and women who were faced with epistemic violence).

Results: There was a paucity of reliable information in about 40% of provinces. Almost all studies applied the direct size estimation methods, but 11 studies used face to face interview and 38 studies used self-administered questionnaires. The non-response bias seemed prominent in entire studies except those on school students. It is important to mention that 97% of papers in general population did not represent any information about the non-response rate. The reported prevalence ranged from 1.37% in university students to 88.8% in patient population. Even among university students, the prevalence varied considerably (1.37% to 34.7%).

Conclusion: The observed huge variations in the reported prevalence of alcohol consumption, due to the methodological consideration, appear largely in Iran. Therefore, it is necessary to develop a standard protocol for data collection and sampling to harmonize the findings in future studies. In addition, it is recommended to assess the frequency of alcohol use by indirect methods such as the Network Scale Up method.

Introduction

Alcohol is a psychoactive substance which causes dependence and it is consumed widely in a diversity of cultures. A large part of the burden of diseases and socioeconomic challenges in every country is attributed to alcohol consumption. Annually, 3.3 million deaths are resulted from harmful utilization of alcohol (5.9% of all deaths) (1,2). More than five percent of disability adjusted life years (DALYs) is related to alcohol abuse (3,4). Moreover, many evidences consider alcohol as a casual factor for different social and health problems such as road crashes, mental disorders, and cancer. Therefore, estimating the prevalence of alcohol consumption for programming and monitoring purposes is vital.

Most of Iranian societies as a Middle Eastern country have Islam as a religion. According to constitution and Islamic values and laws (Sharia), any kind and any amount of alcohol consumption is prohibited in the country. Only a very limited number of religious minorities are allowed to consume it in their privacy as well as their ritual and religious ceremonies with discretion. Nonetheless, a recent Iranian study has indicated an increasing trend for alcohol consumption especially in youths (5).

Different data collection approaches are available for prevalence estimation. The main methods include self-administered questionnaires, interviews, email-based questionnaires, and laboratory tests (6). Each of these methods has their own advantages and disadvantages. Such methods are prone to different types of biases (7). In addition, the optimum method for a western country does not necessarily work for an Eastern country with an Islamic culture.

Many studies have been conducted to estimate the prevalence of alcohol consumption in Iran. A great number of studies focused on special subpopulations such as students, addicts, or patients. In addition, different types of data collection methods were used. Regardless of these issues, the reported life time prevalence of alcohol consumption varies dramatically across provinces and populations (8-11).

The present study aimed at evaluating the methodological challenges of alcohol consumption studies in Iran. Moreover, this is the first systematic review concerning the life time prevalence of alcohol consumption in Iran. We also provided guidelines for futures studies in the field of prevalence estimation in case of sensitive issues such as alcohol consumption.

Material and Methods

Search Strategy

A systematic review of English language articles using the Medline database of National Library of Medicine, SCOPUS, Science Direct, ProQuest, and Google Scholar were conducted. No time limit was considered and all searches were done until January 2015. The medical subject heading (MeSH) searching terms were "alcohol consumption" and "ethanol" combined with "prevalence" and "Iran" including all subheadings. Moreover, all titles, abstracts and conference proceedings in Persian databases using IranMedex, SID, and IranDoc were carefully searched. Also, equivalent Persian keywords of English ones were utilized. Finally, all types of studies measuring alcohol consumption were included. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram depicts the results of the searching process in details (Figure 1).
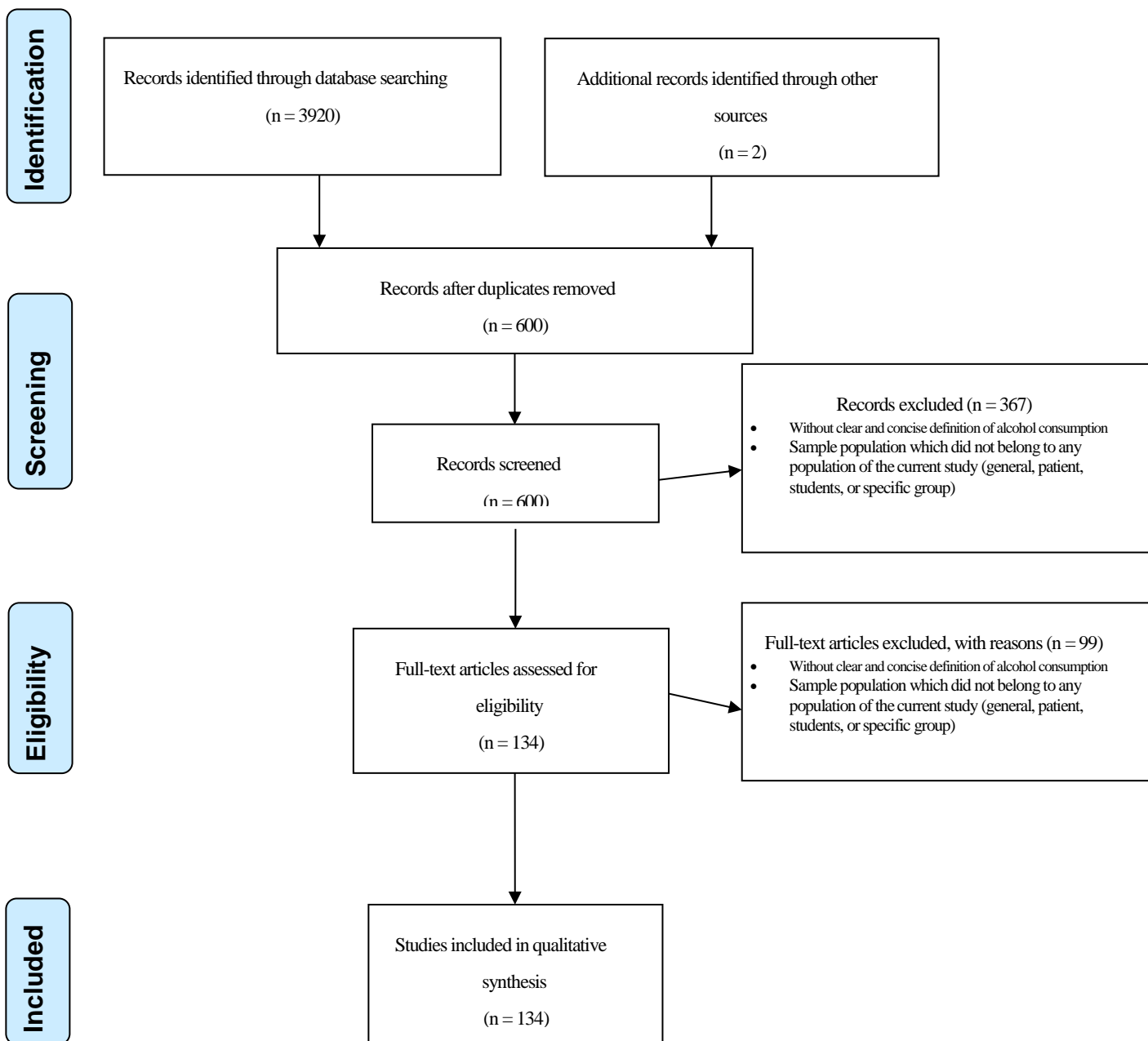
Figure 1. PRISMA diagram of searching process, and selection of appropriate studies

Inclusion and Exclusion criteria

Initially, studies were generally categorized into four subpopulations. The general population consisted of those that were healthy without any specific medical conditions. In contrast with general population, we defined the patient population as the group of people with any medical conditions. The student population was the population including students and adolescents or teenagers. Specific populations were the people who could not be categorized in the mentioned groups like soldiers, road victims, drivers, murders etc.

All studies reporting life time prevalence of alcohol consumption were included. Those studies without a clear and concise definition of alcohol consumption and sample population which did not belong to any population of the current study (general, patient, students, or specific group) were excluded.

Data Extraction and Quality Assessment

Two separate groups (group 1: A.R. and M.S.; group 2: E.M. and Sh. M.) screened all citations and abstracts retrieved from a/the systematic search of the databases, separately. Disagreements at any phase of the review process were negotiated in meetings. In case of unresolved disagreements regarding a consensus for inclusion or exclusion of an article, the article was referred to a third person who was well-informed about the context of the research.

A data extraction excel form was filled by the mentioned groups. Then any doubtful fields were clarified to them in a meeting. The following items were added to the from: study characteristics (first author, title, year of publication, year of running the project, place of project by province and city, language of the document), type of study, sample size, age (mean, SD, and range), sex, type of population (general, patients, students, and specific), methods of sampling (probability and non-probability), sample population (exact term of sample definition, e.g. teenagers), definition of alcohol consumption, and life time prevalence.

Risk of Bias assessment in Studies

The strengths and weaknesses of each study were assessed using a risk of bias (ROB) tool, previously employed in a prevalence study (12). The ROB tool consisted of two parts: external and internal validity of studies. Items in the quality of external validity included close representation of target population, sampling frame, random selection, and non-response rate. The internal validity of the included studies was assessed through the following items; method of data collection (not reported/interview/self-reported), acceptable case definition, and reporting appropriate numerators and denominators. Eventually, the articles were categorized into high risk and low risk of bias. Consequently, those articles<6 were excluded as high risk studies (ROB score: 0-8).

Results

A total of 134 articles out of 223 full text evaluation and reference checking were considered for data extraction. After using ROB score (over 6 scores were included), a total of 37 studies with 49 reports of life time prevalence were included for systematic review. The number of reports was higher than the number of studies since some studies reported the life time prevalence by sex or by our interest (sub-populations).

The majority of studies were carried out on student population (school students 11 studies with 13 reports; university students 11 studies with 20 reports) (13-34), followed by patients with 8 studies (8 reports) (35-42), general population (3 studies with 6 reports) (43-45), and specific population (2 studies with 2 reports) (46,47).

The common method for data collection was self-administrative questionnaires: 38 out of 49 reports collected the data through this approach. In particular, all studies estimated the prevalence among students using self-reported questionnaires. Interview was almost consistently applied in patients and general populations.

Regarding the geographical area, the studies were approximately conducted in sixty percent of provinces (19 out of 31). The majority of reports were from Fars, Kerman, and Tehran provinces. No data were available for about one third of provinces.

The age range for school students was between 13 and 19 years, university students were over 17, patients were between 14 and 94, specific populations were over 20, and general populations were over 15. The sample size of each subgroup was: 20787 for school students, 11666 for university students, 9759 for patients, 1000 for specific population, and 12856 for general population.

School Student population

A total of 14 reports about school students were conducted in only six provinces of Iran (East-Azarbayjan, Fars, Gilan, Hormozgan, Ilam, and Tehran), and these studies used self-reported questionnaires to collect data. The minimum and maximum values were 3.7% to 32.4%, respectively (13, 23). The prevalence was always higher in males than females. The maximum value reported for males and females were 32.4 and 16.8 (13, 17), and the minimum values were 8.9 and 3.7, respectively (16,19). Geographically, life time prevalence of alcohol use among male school students in Fars was about 9.5 times more than other provinces.

The ROB tool revealed that 73% of the reports collected the data through face to face interviews. Regarding close representation, only nine percent of the studies met the criteria. Moreover, 87% of the reports did not mention the data collection method and case definition. Besides, representativeness and using appropriate nominator and denominator were about 13%. Moreover, random selection was only observed in 11% of the studies.

University student population

Data were available from 7 provinces. Tremendous variation was also observed among university students concerning the life time prevalence, from 1.37% (in Southern Khorasan) to 34.7% (in Fars) (27,32). The prevalence was consistently higher in males than females. The maximum values reported for males and females were 32.1% and 6.7% (30), and the minimum values were 20.19% and 1.37%, respectively (28,32).

Evaluating ROB items indicated that collecting data directly from participants was reported in 26% of studies and only 9% of them mentioned non-response

rate. Representativeness, random selection, and other items were about 12-13%.

Patient population

In total, 8 reports were available. Minimum and Maximum statistics were 0.7% to 88.8% (38,41). The minimum value, using medical patients' records for data collection, was reported from a retrospective study conducted in North of Iran (Mazandaran) for esophageal cancer patients. The maximum prevalence was derived from a cohort study conducted in Tehran (the capital of Iran) which used self-report questionnaires for colorectal cancer patients (38,45). No study provided gender specific statistics.

Regarding the method of data collection, 23% of patients' studies pointed out the direct data collection in which only 6% reported non-response rate. Considering close representation and random selection, 11% of studies met the criteria. Furthermore, 15%-17% of the reports mentioned the way the studies defined cases and representativeness of sample as well as choosing the population at risk.

General population

The percentage point difference in terms of the life time prevalence, in general population studies, was 44.4% (2.6% to 47%) (44). These highly discrepant values were reported from the same area, Golestan province, one of the North provinces of Iran. Minimum and maximum values reported for males and females were 39.6% (a national household survey) to 47% (in Golestan), and 2.6% (in Golestan) to 13.7% (a national household survey) respectively (43,44).

Only two reports out of the six studies for general population described the non-response rate. The rest of items were about 16% in these six studies.

Specific population

Two studies were categorized based on specific population. The life time prevalence among first relatives of 1500 opiate addicts over 20 years (Fars province) was reported at 18.2% (46). In another study, women referring to legal medical centers claimed that 43.4% of their husbands had a positive history of alcohol drink during their lives (Tehran) (47). These studies collected the data through interviews.

Considering ROB items, both studies defined cases clearly, denoting the population at risk. Besides, non-response rate was not mentioned in the documents.

Discussion

By using the ROB tool, we only included articles with an acceptable standard level. However, our systematic review reveals a huge variation of the reported prevalence in all subpopulations. For example, the ratio of maximum to minimum prevalence among high school students was about 9 (32.4 over 3.7) (13,16). Corresponding ratios among college students and general population were 25 (34.7 over 1.37) and 18 (47 over 2.6) respectively (27,32,44).

These results suggest that among high school students, the prevalence reported in one study was about 9 times higher than that in another study (13,16). Based on the studies done on the general population, the prevalence in one province was 18 times higher in comparison to another province (44).

We believe that these huge variations are most likely due to methodological challenges rather than geographical variations. Although by using ROB tool, poor studies were excluded from our review, but methods of data collection were mainly face to face interviews or self-administered questionnaires. We assume that even if the researcher considers all methodological challenges in prevalence studies, including selection of a representative sample, still the final prevalence might be biased. This is owing to the validity of the final estimate which only depends on the honesty of the respondent which cannot be measured. This means that only a part of the difference between provinces can be explained by geographical variations.

The main practical challenges observed in the published manuscripts include: a clear definition of alcohol use, selection of a suitable method for size estimation, adoption of an appropriate sampling scheme, selection of a representative sample, and consideration of non-response.

Case Definitions

A clear definition based on the aim of the study is required. When the aim of the research is to estimate life time prevalence of alcohol, even those who have drunk once during their life time should be counted. Therefore, the question should be "have you ever drunk alcohol, even once, during your life?" In other words, the time period and frequency of action should be clarified (48).

Size estimation method

In case of insensitive questions such as proportion of those who had accident in the last year, direct method works well. By using the direct method, we involve the respondent about his own experience. On the other hand, in case of sensitive issues such as the prevalence of Female Sex Workers, direct questions might lead to underestimation of the true parameter. This is mainly due to stigmatized nature of such behaviors. Therefore, alternative indirect size estimation methods such as Network Scale up (NSU), Cross-Wise, or Proxy Respondent can be applied (49-52). In the NSU method, we ask respondents to describe the prevalence of risky behaviors in their network. Therefore, respondents reply on behalf of their network. In Islamic societies such as Iran, alcohol consumption is illegal and against the religious virtue and values, thus, we recommend the application of indirect size estimation methods to cross validate the results.

Selection of a representative sample and sampling scheme

Probability of sampling methods such as simple random sampling and systematic sampling or stratified sampling are those in which every respondent has a known chance of being selected; however, only under simple random and systematic approaches it can be said that everyone has an equal chance. Under stratified sampling, selection probabilities may or may not be equal.

To control the quality of manuscripts, one of our criteria was whether the selected sample represents the population of interest or not. The standard practice is comparing age-sex distribution of the sample with the population in which we wish to generalize the results. However, none of the studies had made such comparisons. Accordingly, it is not possible to check methodological errors in terms of selection of participants.

In case of insensitive issues, these methods could be applied easily. The data can be collected through household surveys. Alternatively, a telephone-based survey can be conducted by generation of random telephone numbers (53).

However, it is hardly possible to perform household or telephone surveys in case of sensitive issues. This is because such methods do not guarantee the confidentiality of the respondents. Even if the research follows indirect methods such as Network Scale Up, respondents might refuse to participate in the study or might not provide accurate replies through household or interview-based methods. Our experience in Iran shows that the chance of positive replies to sensitive issues in street-based methods was significantly higher than household or telephone approaches (53).

Street-based interviewing with pedestrians increases the confidentiality, while it does not guarantee the selection of a representative sample. Therefore, there is a trade-off between 'representativeness of sample' and 'participation of respondents in the study'.

Non-response

Non-response is an inevitable event of investigation especially in alcohol and substance abuse surveys. Non-participation is one source of non-response (54). If refusal to participate is not distributed randomly among eligible respondents, the result is likely to be biased by non-participation (55). Hence, it seems that investigations concerning alcohol and substance consumptions should report non-response rate. Refusal that reflects particular characteristics of those refused to answer should be considered in the analysis.

Another type of non-response event happens when participants start filling out the questionnaire but do not complete the whole sections. In usual practice, such questionnaires are excluded. However, exclusion of incomplete questionnaires leads to power reduction and estimation with low precision. In this case, it is necessary to investigate whether missing data depends on characteristics of the respondent or not. If yes, then imputation methods are available to recover the data.

Use of Survey Methods

Alcohol consumption is highly dependent upon sex and age. The age and sex distribution of the selected samples should not match with the target population. Otherwise, appropriate waiting and adjustment techniques need to be applied. Such techniques apply appropriate weight to correct sampling (56).

Conclusion

To summarize, huge variations observed in reported prevalence might be due to methodological errors. While there is no gold standard in size estimation for hidden groups, we do recommend the use of different methods (in particular indirect approaches) to cross validate the findings.

Conflict of interest statement

The authors declare no conflict of interest.

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