LETTER



Meta-analysis of 5-year survival data for cancers without considering time is misleading

Masoud Mohammadi^{1,2*}

Dear Editor,

Survival analysis is a branch of statistical methods that analyzes time-to-event data. More precisely, time-toevent data are those outcomes of interest that are examined over time and up to the time of their occurrence [1, 2], These analyses, especially in the study of survival rates in cancer patients, can be considered as an indicator for evaluating and improving various treatment methods and can express how likely a person is to survive if they are diagnosed with a specific type of cancer and then how likely they are to survive if they undergo therapeutic interventions such as surgery, chemotherapy, and other treatments. Therefore, based on the above explanations, survival in cancer patients is a convenient and significant issue [1, 2], Also, the concept of time should not be overlooked in survival studies, and it should be noted that this concept is currently more applicable in longitudinal studies.

In addition to median survival time, relative survival is also used to assess survival rates in cancer patients [3]. However, a widely used indicator in cancer patients is the 5-year survival rate. This indicator expresses the percentage of people who will survive for 5 years after cancer

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diagnosis and does not include those who die from diseases other than the cancer in question [4]. For example, one study reported that the 5-year relative survival rate for breast cancer is 96%, meaning that 96 out of every 100 women with breast cancer will survive at least 5 years after diagnosis [5].

But the interesting thing about examining the 5-year survival rate is the presence of the two words, the rate of survival and presenting a percentage report for 5-year survival, which seems contradictory because rate and survival are two issues in which time is important, while 5-year survival is mentioned as a percentage and a proportion. The issue becomes more interesting when we know that in cancer such as breast cancer, several factors have been proposed as prognostic factors for survival in breast cancer, such as higher stage of the disease, higher number of lymph nodes involved, type of tumor pathology, higher grade or severity of the tumor, negative estrogen and progesterone receptors, higher expression of the Her2neu oncogene, age of onset before menopause, receipt of different types of treatments (surgery, radiotherapy, chemotherapy, hormone therapy), socioeconomic status, education, reproductive status, and body mass index [5, 6], and these factors vary greatly in different cancers.

While many studies report 5-year survival rates for a specific type of cancer [6, 7], is a meta-analysis of 5-year survival rates and the results of all studies in this field a true indicator of survival rates? Were these studies consistent in terms of all prognostic factors? Is meta-analysis of survival valid? Is time taken into account in these meta-analyses? Is conducting a meta-analysis based



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^{*}Correspondence:

Masoud.mohammadi1989@yahoo.com

¹ Department of Epidemiology and Biostatistics, Faculty of Health, Isfahan university of medical science, Isfahan, Iran

² Research Center for Social Determinants of Health, Jahrom University of Medical Science, Jahrom, Iran

on the presented 5-year survival rate for a cancer similar to conducting a meta-analysis of the prevalence of a disease?

To answer, we must say that because we have mentioned many prognostic factors above, for example, breast cancer, and of course other cancers are similar. Also, survival studies are very time-dependent, so reporting 5-year cancer survival in a research study is not a problem [6, 7], but a meta-analysis of survival rates based on all studies obtained in a systematic review will reveal a very high heterogeneity in these studies, because each study was conducted on specific patients with different conditions, and in examining the concept of survival rates for patients, the time index is very important; this is the greatest heterogeneity in these studies, and patients have very different conditions at different times, and this difference affects their survival.

Therefore, it is not appropriate to use meta-analysis to calculate 5-year survival rates. Such an analysis cannot be like a meta-analysis of prevalence due to the inability to homogenize time and the effect of time on patient survival. We cannot express an overall 5-year survival rate for cancer from different studies at different times because time was not included in our meta-analysis. This is while, from an epidemiological perspective, prevalence is a proportion and, reported as a percentage, time does not play a role in it, and it is not a rate. Therefore, researchers working in the field of systematic reviews and meta-analysis are expected to pay attention to the issue of time in survival analyses and to refrain from meta-analysis on indicators that are strongly dependent on time and not examine it like prevalence meta-analysis.

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MM contributed to the design and prepared the manuscript and helped in the interpretation of the study. The author has read and approved the content of the manuscript.

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