

Abstract

This study's purpose is to summarize the attributes of the 100-most cited articles on sleep and circadian rhythms and to examine both past and present research hotspots/trends.

Literature searches (from inception to 2018) using Web of Science databases were carried out to recognize sleep and circadian rhythms-related articles

An examination of the trending topics revealed that Genetics of circadian rhythms, Light effects on circadian rhythms, Interactions between sleep homeostasis and circadian rhythms, Impact of circadian preference on behavior, TIM (timeless) protein and its ability to reset the 'ticking' of our body's clock, and Circadian disruption and health were the most talked about and currently further research is being explored in those areas. Diving in further, key links between circadian rhythm disruption and neurodegeneration were discussed

While clear links between sleep disruptions and neurodegeneration exist, researchers should be cautious when incorporating sleep disruption as a clinical indicator for a multitude of reasons: sleep disturbances can have many causes - neurodegenerative conditions are just one contributor, so sleep issues alone cannot definitively diagnose a neurodegenerative disorder. Second, Reverse-causality: It is often difficult to determine causality - sleep/circadian disruption may contribute to neurodegeneration, but neurodegeneration also disrupts sleep circuits. And there is individual variability in sleep patterns, sleep needs, and responses to sleep deprivation. Using sleep as a biomarker may be complicated by this variability. Finally, sleep changes may occur years before onset of cognitive or motor symptoms, so sleep disruptions alone cannot precisely predict timing of disease onset.

Methods

Literature searches (from inception to 2018) using Web of Science databases were carried out to recognize sleep and circadian rhythms-related articles., the top 100 most-cited articles were accumulated. Initially, a comprehensive search yielded a total of 141 preliminary results. After screening these results for eligibility, 41 studies were identified as non-eligible based, while 100 were considered eligible. From the pool of eligible studies, 57 articles were identified. Of the 57, 40 were review papers and 3 were proceeding papers.

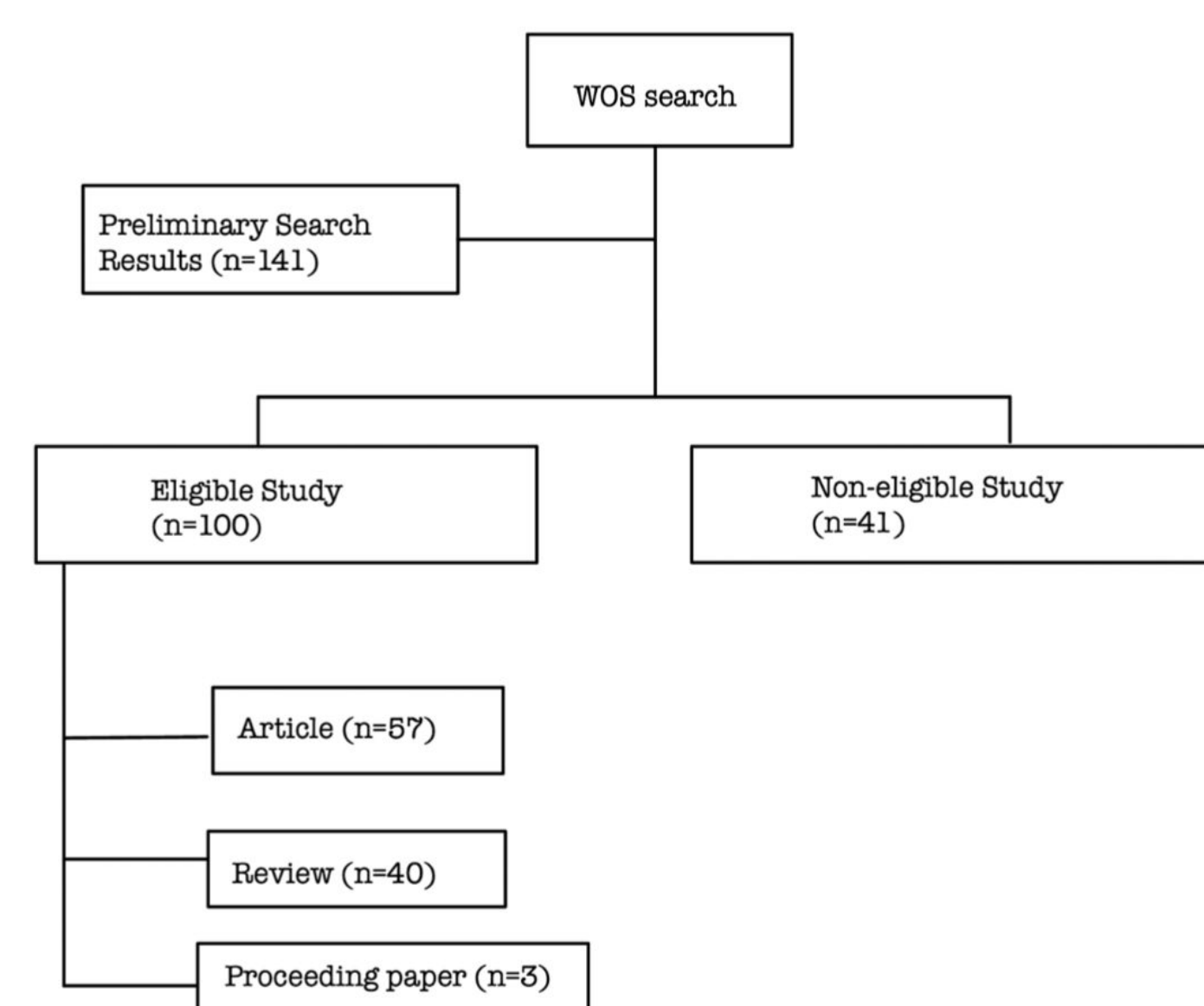


Figure 1: flow diagram of the literature search process outlining the number of studies that were identified, included and excluded at each stage.

Results

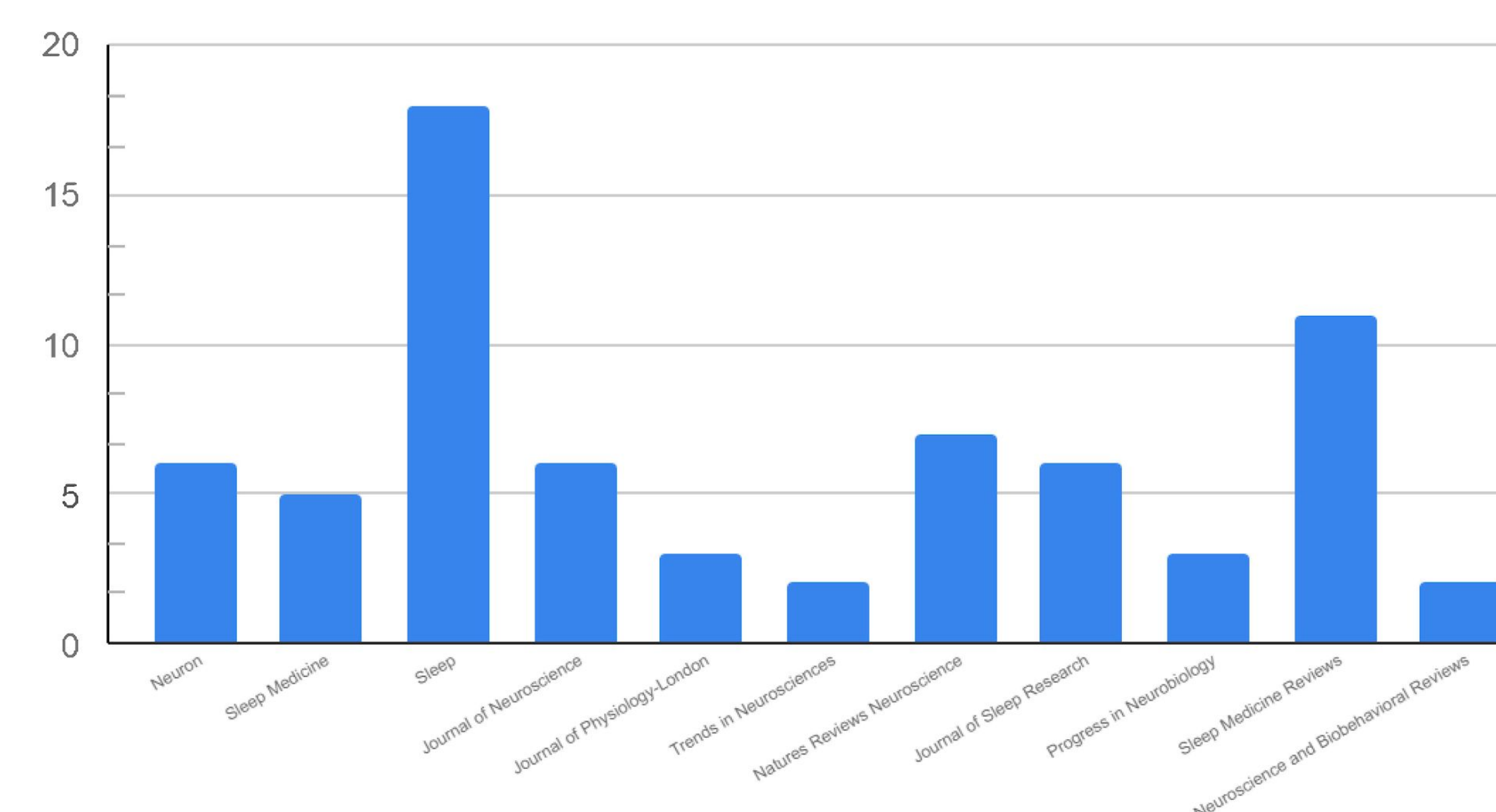
The top 100 most-cited articles on sleep and circadian rhythm were selected from 15,741 papers. The publication year ranged from 1991 to 2017, and all papers were written in English. The most frequently studied neurological outcomes included cognitive impairment, Alzheimer's disease, Parkinson's disease, and other dementias.

Specifically, 56 studies reported a link between poor sleep quality or duration and cognitive decline or dementia. Shorter sleep duration was correlated with reduced cognitive performance across the lifespan. Sleep disturbances were also associated with accelerated cognitive aging and higher dementia risk.

Additionally, 45 papers found relationships between shift work schedules or circadian misalignment and neurological dysfunction. Shift workers were found to be at increased risk of cognitive impairment and dementia. Disruptions to circadian rhythms due to irregular schedules or clock gene mutations were linked to poorer cognitive function and higher incidence of neurodegenerative diseases.

While the majority of studies were observational, the randomized controlled trials and meta-analyses substantiated these findings. Interventions to improve sleep showed benefits for cognitive performance, while circadian misalignment was detrimental. Overall, these top cited papers provide substantial evidence for associations between sleep/circadian disruption and adverse neurological health across the lifespan. However, further research is needed to establish causality and underlying mechanisms.

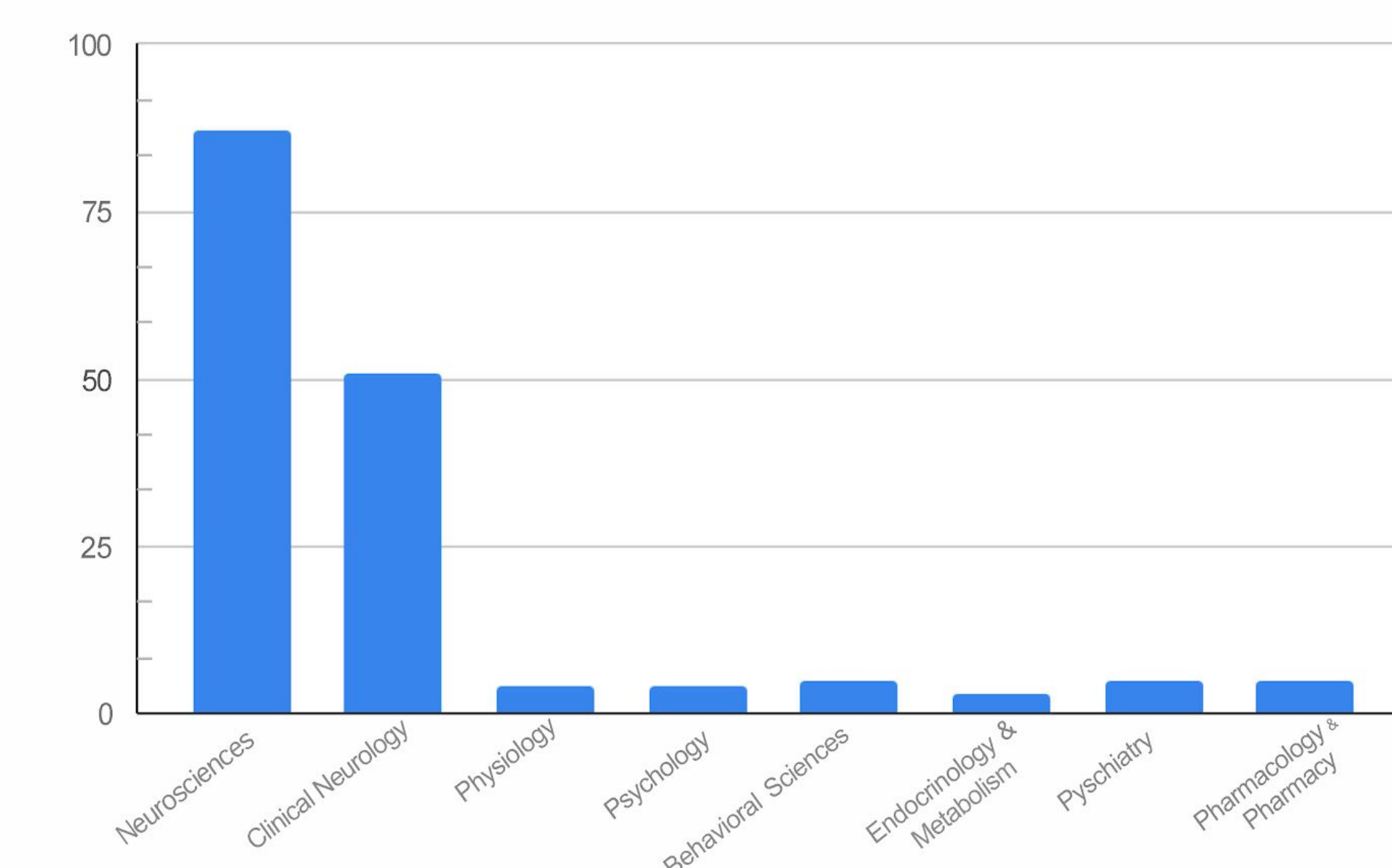
Figure 4. Sources with 2 or more papers of the top 100-cited articles



Conclusions

- Analysis of the top 100 cited papers reveals an extensive body of evidence linking sleep and circadian disruption to neurodegeneration.
 - The majority of high-impact studies report associations between irregular sleep-wake patterns, circadian misalignment, and adverse neurological outcomes like cognitive decline, dementia, Alzheimer's, and Parkinson's disease.
 - However, the observational nature of most studies precludes determining causality. More rigorous longitudinal and experimental research is needed.
 - Sleep disturbances across the lifespan, including insufficient sleep and irregular schedules, correlate with poorer cognitive performance and accelerated cognitive aging.
 - Shift work and circadian misalignment due to irregular schedules or clock gene mutations are associated with increased risk of neurodegenerative diseases.
 - While findings are intriguing, causal relationships cannot be definitively concluded based on correlational data alone.
 - Further research should continue to probe biological mechanisms, employ longitudinal designs, conduct RCTs, and utilize animal models.
- In summary, evidence suggests supporting healthy sleep and circadian rhythms may help prevent neurodegeneration, but more research is still needed before translating findings to clinical recommendations.

Figure 5. WoS Categories with two or more papers of top 100-cited articles



References

- Web of science DB
- R-Studio
- Bibliometrix/shiny
- National library of medicine