



4-30-2024

Section: Public health

## Assessment of Multiple Sclerosis Patients' awareness and knowledge about their illness in KSA: A cross-sectional study

Nora L. El-Tantawy

*Department of Public Health, Faculty of Applied Medical Sciences, Al-Baha University, Al-Baha, Saudi Arabia, ntantawy@bu.edu.sa*

Sabrin ghurmullah Alzhrani

*Department of Public Health, Applied Medical Sciences College, Al-Baha University, Al-Baha, 26831, Saudi Arabia, Sabrin1422@icloud.com*

Shahad Ahmed Alzahrani

*Department of Public Health, Applied Medical Sciences College, Al-Baha University, Al-Baha, 26831, Saudi Arabia, iishd.zh9@gmail.com*

Reema Mohammed Alzahrani

*Department of Public Health, Applied Medical Sciences College, Al-Baha University, Al-Baha, 26831, Saudi Arabia, reemamohammed166@gmail.com*

Follow this and additional works at: <https://aimj.researchcommons.org/journal>

Razan Ali Alghamdi

*Department of Public Health, Applied Medical Sciences College, Al-Baha University, Al-Baha, 26831, Saudi Arabia, Razanali2001@icloud.com*  
Commons

See next page for additional authors

### How to Cite This Article

El-Tantawy, Nora L.; Alzhrani, Sabrin ghurmullah; Alzahrani, Shahad Ahmed; Alzahrani, Reema Mohammed; Alghamdi, Razan Ali; Alghamdi, Asma Saad; and Abouhussien, Rabab M. (2024) "Assessment of Multiple Sclerosis Patients' awareness and knowledge about their illness in KSA: A cross-sectional study," *Al-Azhar International Medical Journal*: Vol. 5: Iss. 4, Article 8.

DOI: <https://doi.org/10.58675/2682-339X.2352>

This Original Article is brought to you for free and open access by Al-Azhar International Medical Journal. It has been accepted for inclusion in Al-Azhar International Medical Journal by an authorized editor of Al-Azhar International Medical Journal. For more information, please contact [dryasserhelmy@gmail.com](mailto:dryasserhelmy@gmail.com).

---

## **Assessment of Multiple Sclerosis Patients' awareness and knowledge about their illness in KSA: A cross-sectional study**

### **Authors**

Nora L. El-Tantawy, Sabrin ghurmullah Alzhrani, Shahad Ahmed Alzahrani, Reema Mohammed Alzahrani, Razan Ali Alghamdi, Asma Saad Alghamdi, and Rabab M. Abouhussien

# Assessment of Multiple Sclerosis Patients' awareness and knowledge about their illness in KSA: A cross-sectional study

Nora L. El-Tantawy \*, Sabrin G. Alzhrani, Shahad A. Alzahrani, Reema M. Alzahrani, Razan A. Alghamdi, Asma S. Alghamdi, Rabab M. Abouhussien

Department of Public Health, Applied Medical Sciences College, Al-Baha University, Al-Baha, Saudi Arabia

## Abstract

**Objectives:** Multiple Sclerosis (MS) is prevalent worldwide and commonly elicits neurological impairment. Knowledge and awareness assist in better managing the illness. Evaluating the level of knowledge and awareness among MS students is crucial to implementing an effective educational campaign.

**Aim:** to assess how well-informed MS patients are about their condition.

**Methods:** We conducted this study among MS patients in KSA. We collected data via a pre-designed questionnaire, which included sociodemographic data, disease course status, the participants' MS information sources, and possible associated risk factors. We employed a validated MS knowledge questionnaire (MSKQ-25) to assess patients' awareness of their illness.

**Results:** Of the 343 participants, 56.6% were female, and 38.5% were in the 26–35 age range. Most participants (62.7%) get their information about MS via social media. There is a statistically significant difference ( $P = 0.000$ ) between knowledge level and age, educational status, and course of the disease. The participants have a good knowledge level (>70%) about the nature of the disease, its course, and treatment options. A moderate level of knowledge (50–70%) was noted about the MS diagnostic modalities and procedures, and low knowledge (<50%) about the disease prevalence, causation, and predisposing factors.

**Conclusions:** Most of the participants have a good knowledge level (>70%) about many aspects of the MS but are still unaware of others or have a low level of knowledge (<50%). So, it is better to implement awareness-raising educational programs by healthcare workers for MS patients to improve their knowledge level about their illness.

**Keywords:** Multiple Sclerosis, knowledge, MSKQ-25, KSA

## 1. Introduction

Multiple sclerosis (MS) is a diverse demyelinating and neurodegenerative illness that involves the central nervous system and has varying presentations, courses, and prognosis. <sup>1</sup> MS incidence is increasing and becoming more prevalent worldwide in both developed and developing countries. <sup>2</sup> An estimated 2.8 million individuals worldwide suffer from MS, which is

considered a primary cause of disability, particularly among young adults. <sup>3</sup> Al-Jumah and Abumelha <sup>4</sup> conducted a national study in Saudi Arabia, finding an overall MS prevalence of 40.40/100,000 for the general population and 61.95/100,000 for Saudi residents. This indicates a significant increase in MS prevalence, classifying the kingdom as a low-risk zone according to the Kurtzke classification. <sup>5</sup>

Accepted 14 April 2024.  
Available online 30 April 2024

\* Corresponding author at: Public Health, Applied Medical Sciences College, Al-Baha University, Al-Baha, 26831, Saudi Arabia.  
E-mail address: [ntantawy@bu.edu.sa](mailto:ntantawy@bu.edu.sa) (N.L. El-Tantawy).

<https://doi.org/10.58675/2682-339X.2352>

2682-339X/© 2024 The author. Published by Al-Azhar University, Faculty of Medicine. This is an open access article under the CC BY-SA 4.0 license (<https://creativecommons.org/licenses/by-sa/4.0/>).

Unfortunately, we still don't know exactly what causes MS or how it starts. However, factors like location, genetic alleles, sex, low blood vitamin D levels, smoking, UVB radiation exposure, childhood obesity, parental closeness, and Epstein-Barr virus infection are known to play a major role.<sup>6,7</sup> Multiple sclerosis's journey begins with being at risk and continues through the asymptomatic, prodromal, and symptomatic stages of the disease. When an individual complains of a clinically isolated syndrome—which can be either mono- or poly-symptomatic depending on the site and extent of the lesion(s)—MS is typically considered.<sup>8</sup> Common neurological symptoms include changes in mood, numbness, weakness, exhaustion, discomfort, bladder dysfunction, loss of coordination and balance, and visual impairment.<sup>8</sup> Relapses in MS typically happen sub-acutely, lasting hours to days before plateauing and then slowly improving. With decreased recurring inflammatory activity, both main and secondary progressive MS disease courses show increasing clinical impairment.<sup>9</sup>

Multiple sclerosis may have evidential consequences for affected persons, their families, and the community since it often occurs during a very productive period of life when people are beginning families and establishing professions. The expanding arsenal of disease-modifying treatments<sup>10</sup> presents opportunities to lessen impairment and improve the survival of MS patients.<sup>11</sup> Nevertheless, there is currently no effective treatment and little knowledge about what causes the illness.

There is an ongoing, pressing need for high-quality epidemiological data to enhance our understanding of the risk factors for illness across the world and support advocacy initiatives and health policies aimed at addressing the specific requirements of individuals with MS.<sup>3</sup> Context-specific data about the target population's knowledge, awareness, and perception is crucial for the successful implementation of any health promotion program. However, there needs to be more data about MS patients' knowledge and awareness of their illness in Saudi Arabia. Therefore, our research aimed to assess the level of knowledge and awareness that MS patients have regarding their illness and estimate the risk factors that are associated with it.

## 2. Subjects and Methods

### 2.1. The study's design and participants:

The MS patients at KSA participated in this cross-sectional study from January 2023 to May 2023. The study enrolled patients with a provisional MS diagnosis who were under 18 years old and willing to participate. We obtained consent from each participant at the start of the questionnaire. We kept the participants' responses private and confidential. The institutional review board of the continuous medical education committee at King Fahad Hospital (KFH/IRB20112022/3) approved the study. We used the Richard Geiger equation to determine the minimal sample size, ensuring a 95% confidence level and 80% power.<sup>12</sup> We calculated it based on the estimated number of MS patients in Saudi Arabia, 40.40/100,000 for the general population.<sup>5</sup> We determined that a minimum sample size of 345 was adequate for our study, and ultimately, we obtained a final sample size of 343.

### 2.2. Tools and measurements:

We distributed a semi-structured questionnaire electronically to MS patients. The questionnaire includes three sections: the first part includes sociodemographic data (age, sex, employment, marital status, and educational level); the second part asks about disease course status and its possible associated risk factors (family history, smoking, obesity, vitamin D deficiency, and childhood infection); and the third part includes items that assess patients' knowledge about MS.

We used the MS knowledge questionnaire (MSKQ-25) to assess patients' knowledge about MS. We obtained permission from the corresponding author to use his questionnaire.<sup>13</sup> Experts proficient in both English and Arabic translated the MSKQ-25 into Arabic before its distribution. A previous study assessed the questionnaire's content validity, internal consistency (Kuder-Richardson-20 Eq. 0.76), and validity, and the results were positive.<sup>13</sup>

The questionnaire entails 25 items about MS. Every item has three to five multiple-choice responses for each question. There was an exception to question number 3, which was asking about the disease's prevalence in Italy (Q3), and it has been replaced by another question asking about the estimated prevalence in Saudi Arabia. Each correct response earned one point. As a result, zero is the lowest possible score, and 25 is the greatest.

### 2.3. Statistical analysis:

We exported the data to Microsoft Excel 2019. We analyzed the raw data using IBM Statistical Package for Social Sciences (SPSS) software version 26. The statistical test listed below was done. We measured the qualitative variables using frequencies and percentages and the quantitative variables using the measure of central tendency. In the analysis of variance, the Chi-square test and the Mann-Whitney U test were utilized. The confidence intervals were 95% CI with a margin of error of 5%; all p values less than 0.05 were considered statistically significant.

### 3. Results

The participant's level of knowledge about multiple sclerosis is based on their demographic data.

Table 1. Demographic data of the studied patients with different levels of knowledge about Multiple Sclerosis

VARIABLE	%	MSKQ SCORE < 5 0%	MSKQ SCORE 50% TO ≤ 70%	MSKQ SCORE > 70%	P- VALUE
		n = 123 (35.9%)	n = 198 (57.7%)	n = 22 (6.4%)	
<b>SEX</b>					
MALE	149 (43.4%)	61 (49.6%)	81 (40.9%)	7 (31.8%)	.164
FEMALE	194 (56.6%)	62 (50.4%)	117 (59.1%)	15 (68.2%)	
<b>AGE GROUPS</b>					
18–25	67 (19.5%)	13 (10.6%)	40 (20.2%)	14 (63.6%)	.000**
26–35	132 (38.5%)	53 (43.1%)	79 (39.9%)	0 (0.0%)	
36–45	116 (33.8%)	41 (33.3%)	67 (33.8%)	8 (36.4%)	
> 45	28 (8.2%)	16 (13.0%)	12 (6.1%)	0 (0.0%)	
<b>EDUCATIONAL LEVEL</b>					
PRIMARY	10 (2.9%)	10 (8.1%)	0 (0.0%)	0 (0.0%)	.000**
SECONDARY	98 (28.6%)	48 (39.0%)	43 (21.7%)	7 (31.8%)	
UNIVERSITY	235 (68.5%)	65 (52.8%)	155 (78.3%)	15 (68.2%)	
<b>MARITAL STATUS</b>					
MARRIED	159 (46.4%)	78 (63.4%)	74 (37.4%)	7 (31.8%)	.000**
SINGLE	149 (43.4%)	30 (24.4%)	104 (52.5%)	15 (68.2%)	
DIVORCED	30 (8.7%)	10 (8.1%)	20 (10.1%)	0 (0.0%)	
WIDOW	5 (1.5%)	5 (4.1%)	0 (0.0%)	0 (0.0%)	
<b>EMPLOYMENT</b>					
WORKING	154 (44.9%)	54 (43.9%)	93 (47.0%)	7 (31.8%)	.414
NOT WORKING	189 (55.1%)	69 (56.1%)	105 (53.0%)	15 (68.2%)	
<b>DISEASE STATUS</b>					
RELAPSING	270 (78.7%)	101 (82.1%)	147 (74.2%)	22 (100%)	.010**
CONTINUOUS	73 (21.3%)	22 (17.9%)	51 (25.8%)	0 (0.0%)	

\*\* Indicated a highly significant correlation (p<0.01)

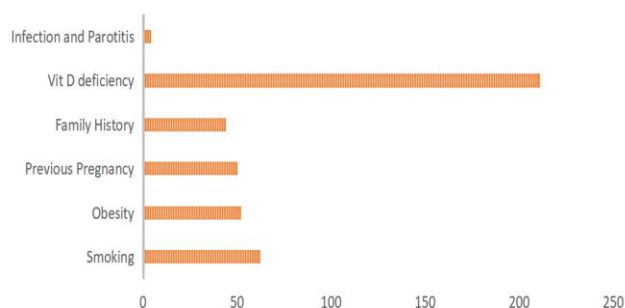


Figure 1. The possible predisposing factors for Multiple sclerosis

We received 365 responses from patients with multiple sclerosis. However, we only used 343 responses in the final analysis, as we deleted 22 responses due to their failure to meet our study eligibility criteria. As shown in Table 1, the participants were 194 (56.6%) females and 149 (43.4%) males, with a mean age of  $34.26 \pm 8.48$ . The participants were educated at the university level (68.5%), unemployed (55.1%), married (46.4%), and had a relapsing disease course (78.7%). There is no statistically significant difference between males and females regarding their level of knowledge about MS. However, there is a significant association between MS knowledge and factors such as age, educational level, marital status, and the course of the disease. Table 1. Regarding the possible associated risk factors, vitamin D deficiency is the only possible predisposing factor, with a high percentage among participants 211 (61.5%), as shown in Fig. 1. The majority of participants (62.7%) learned about MS through social media and the Internet, followed by friends and relatives (27.1%). Healthcare workers (10.2%) provided the least amount of information.

Table 2. Score of correct knowledge among the studied patients

Q		MSKQ SCORE < 50 %	MSKQ SCORE 50% TO ≤ 70%	MSKQ SCORE > 70 %	CORREC T ANSWER S	P- VALU E	LEVEL OF AWARENES S AND KNOWLED GE
		n = 123	n = 198	n = 22	n = 343		
<b>NATURE OF THE DISEASE</b>							
1	Organs involved in MS	107 (87.0%)	191(86.5%)	22 (100%)	320 (93.3%)	.003**	High
2	CNS composition	93 (75.6%)	186(93.9%)	22 (100%)	301(87.8%)	.000**	High
4	Impact of MS on life expectancy	74 (60.2%)	132 (66.7%)	22 (100%)	228 (66.5%)	.001**	high
5	MS as immune disease	33 (26.8%)	149 (75.3%)	16 (72.7%)	198 (57.7%)	.000**	High
6	MS as a contagious disease	20 (16.3%)	30 (15.2%)	18(81.8%)	68 (19.8%)	.000**	Low
10	Myelin/axon damage	0 (0.0%)	20 (10.1%)	5 (22.7%)	25 (7.3%)	.000**	Low
13	Myelin function	120 (97.6%)	198 (100%)	22 (100%)	340 (99.1%)	.079	High
<b>PREDISPOSING FACTORS AND PREVALENCE</b>							
3	Prevalence of MS in Saudi Arabia	44 (35.8%)	93 (47.0%)	19 (86.4%)	156 (45.5%)	.000	Moderate
11	Age of onset	28 (22.8%)	70 (35.4%)	9 (40.9%)	107 (31.2%)	.036**	Low
12	Ratio of sex in MS prevalence	83 (67.5%)	159 (80.3%)	22 (100%)	264 (77%)	.000**	High
23	Pregnancy impact on MS	8 (6.5%)	36 (18.2%)	10 (45.5%)	54 (15.7%)	.000**	Low
<b>CAUSATION AND GENETIC FACTOR</b>							
7	MS etiology	2 (1.6%)	16 (8.1%)	6 (27.3%)	24 (7.0%)	.000**	Low
8	Transmission of MS to offspring	15 (12.2%)	11 (5.6%)	17 (77.3%)	43 (12.5%)	.000**	Low
9	Transmission of MS to other family member	52 (42.3%)	139 (70.2%)	20 (90.9%)	211 (61.5%)	.000**	High
<b>DIAGNOSTIC PROCEDURES AND METHODS</b>							
14	Used tests to diagnose MS	72 (58.5%)	170 (85.9%)	22 (100%)	264 (77.0%)	.000**	High
15	MRI role in MS diagnosis	40 (32.5%)	122 (61.6%)	18 (81.8%)	180 (52.5%)	.000**	Moderate
16	Gadolinium injections' role during MRI	41 (33.3%)	144 (72.7%)	18 (81.8%)	203 (59.2%)	.000**	Moderate
17	MRI role on disease follow-up	24 (19.5%)	38 (19.2%)	6 (27.3%)	68 (19.8%)	.689	Low
18	Role of lumbar puncture	8 (6.5%)	42 (21.2%)	0 (0.0%)	50 (14.6%)	.000**	Low
19	Frequency of lumbar puncture	89 (72.4%)	192 (97.0%)	22 (100%)	303 (88.3%)	.000**	High
20	Definite diagnosis of MS	36 (29.3%)	104 (52.5%)	22 (100%)	162 (47.2%)	.000**	Moderate
<b>COURSE AND TREATMENT</b>							
21	Definition of remittent MS	32 (26.0%)	106 (53.5%)	19 (86.4%)	157 (45.8%)	.000**	Moderate
22	Benign MS	68 (55.3%)	171 (86.4%)	12 (54.5%)	251 (73.2%)	.000**	High
24	Curative treatment	72 (58.5%)	181 (91.4%)	22 (100%)	275 (80.2%)	.000**	High
25	Types of MS disease targeted by current therapies	92 (74.8%)	193 (97.5%)	22 (100%)	307 (89.5%)	.000**	High

\*\*p<0.01

The level of participants' knowledge regarding each MSKQ-25 questionnaire item was assessed.<sup>14</sup> categorized the responses into three groups: the first group included participants whose MSKQ-25 score was less than 50%, the second group included participants whose MSKQ-25 score ranged from 50% to 70%, and the third group included participants whose MSKQ-25 score was less than 70%. There were 123 (35.9%) participants categorized in the second group, 198 (57.7%) in the first group, and 22 (6.4%) in the third group. The average MSKQ score was  $13.29 \pm 2.92$ . The lowest score was 7 (5%), and the highest score was 21 (0.6%) out of 25. As shown in Table 2, there is a high level of knowledge with regard to the disease's nature (1–13) and its treatment modalities (21–25). The questions Q1, Q13, and Q25 received the most accurate responses. Q7 and Q10 were the least likely to receive successful answers. There is a high level of knowledge regarding the nature of the disease; 320 (93.3%) of the participants knew the organs involved in the disease, 340 (99.1%) knew the myelin function, and 198 (57.7%) knew that it is a disease of the immune system. However, there is a lack of knowledge about myelin and axon damage. Only 25 people (7.3%) and 19.8% understand that myelin and axon damage is not a contagious illness.

The prevalence and predisposing factors of MS are not well known to the participants, as only 15.7% know that MS has an impact on pregnancy, and 31.2% know about the age of the onset of the disease. Nearly half the participants (45.5%) know the prevalence of MS in Saudi Arabia. Also, many of them need more knowledge about the disease's causation and genetic factors; only 7.0% knew about MS etiology. About 77.0 percent knew the tests used for MS diagnosis, but only 14.6% knew the role of the lumbar puncture in the diagnosis, and 19.8% knew about the role of MRI in the follow-up. Most of the participants have a high level of knowledge about the course of the disease and its treatment options.

#### 4. Discussion

The findings of this study contribute to our understanding of the knowledge and awareness landscape among MS patients in KSA. While participants demonstrated commendable understanding in certain domains, notable knowledge gaps were evident, aligning with similar observations in the region. For instance, the study by [Al-Jumah and Abumelha], on the prevalence of MS in Saudi Arabia highlighted the disease's rising impact.

Prevalence rates of 40.40/100,000 for the general population and 61.95/100,000 for Saudi citizens were recorded. This indicates a significant rise, surpassing the low-risk zone classification, according to .<sup>5</sup> Herein, we noted that the prevalence of good MS knowledge among MS patients is in agreement with other Saudi studies, such as that conducted by <sup>13</sup> on the general population of the Al-Qassim region and <sup>15</sup> in the Riyadh region, which found that 30.3% of respondents were aware of and had a good understanding of MS. On the other hand, the current study's prevalence of good knowledge is substantially higher than that of Majmaah, which was 12.7% average/good knowledge. Still, the target group was the general population .<sup>16</sup>

The study's participants, much like those in other regions, exhibited strong awareness of certain aspects of MS, such as the nature of the disease and available treatment modalities .<sup>13</sup> However, similar to the observations made by <sup>14</sup>, critical gaps persist, particularly concerning disease prevalence, genetic factors, and specific diagnostic procedures. The participants' reliance on social media and the Internet as primary sources of information echoes trends observed in other studies <sup>16</sup>. While digital platforms offer unprecedented opportunities for disseminating health-related knowledge, there is a need for caution. Ensuring the accuracy and reliability of information on these platforms is crucial to preventing the spread of misinformation. A significant aspect of believing in transparent information is reliance on authentic sources <sup>17</sup>, like the recommendation of the <sup>18</sup> study that proved written materials may be a successful, low-cost, and simple-to-implement technique for improving popular comprehension of an ailment or its treatment, particularly for the patients and their relatives.

The influence of sociodemographic factors on MS knowledge aligns with broader trends identified in studies worldwide. Age, educational level, marital status, and disease course emerged as significant determinants of awareness, consistent with findings from diverse cultural contexts <sup>13, 14</sup>. Tailoring educational interventions to these demographic characteristics could enhance their effectiveness.

Drawing parallels with international studies, our findings emphasize the universal challenge of addressing knowledge gaps in MS patient communities. Bridging these gaps is essential not only for improving patient understanding but also for informing advocacy efforts and shaping health policies. As we navigate the evolving landscape of MS, collaborative efforts between healthcare providers, policymakers, and patient communities are imperative to foster a well-informed and empowered MS population in Saudi Arabia.

Despite the limitations inherent in any population survey study, such as the reliance on self-reported data and the potential for recall bias, the insights gained from this research are invaluable. They provide a foundation for developing targeted health promotion programs that address the identified knowledge gaps. Integrating these findings into comprehensive strategies could not only enhance the understanding of MS among patients but also contribute to broader advocacy initiatives and health policies. As we navigate the evolving landscape of MS, bridging these knowledge gaps is paramount for fostering a well-informed and empowered MS community in Saudi Arabia.

## 5. Conclusion

Most of the participants have a good knowledge level (>70%) about many aspects of the MS but are still unaware of others or have a low level of knowledge (<50%). So, it is better to implement awareness-raising educational programs by healthcare workers for MS patients to improve their knowledge level about their illness.

## Disclosure

The authors have no financial interest to declare in relation to the content of this article.

## Authorship

All authors have a substantial contribution to the article

## Funding

No Funds : Yes

## Conflicts of interest

There are no conflicts of interest.

## References

- Mey GM, Mahajan KR, DeSilva TM. Neurodegeneration in multiple sclerosis. *WIREs Mech Dis*. 2023;15(1):e1583.
- Browne P, Chandraratna D, Angood C, et al. Atlas of Multiple Sclerosis 2013: A growing global problem with widespread inequity. *Neurology*. 2014;83(11):1022-1024.
- Walton C, King R, Rechtman L, et al. Rising prevalence of multiple sclerosis worldwide: Insights from the Atlas of MS, third edition. *Mult Scler*. 2020;26(14):1816-1821.
- AlJumah M, Bunyan R, Al Otaibi H, et al. Rising prevalence of multiple sclerosis in Saudi Arabia, a descriptive study. *BMC Neurol*. 2020;20(1):49.
- Kurtzke JF. Rating neurologic impairment in multiple sclerosis: an expanded disability status scale (EDSS). *Neurology*. 1983;33(11):1444-1452.
- Ascherio A. Environmental factors in multiple sclerosis. *Expert Rev Neurother*. 2013;13(12 Suppl):3-9.
- Al Wutayd O, Mohamed AG, Saeedi J, Al Otaibi H, Al Jumah M. Environmental exposures and the risk of multiple sclerosis in Saudi Arabia. *BMC Neurol*. 2018;18(1):86.
- Wallin MT, et al. Global, regional, and national burden of multiple sclerosis 1990–2016: a systematic analysis for the global burden of disease study 2016. *Lancet Neurol*. 2019;18:269–85.
- Dobson R, Giovannoni G. Multiple sclerosis - a review. *Eur J Neurol*. 2019;26(1):27-40.
- Beiki O, Frumentio P, Bottai M, Manouchehrinia A, Hillert J. Changes in the Risk of Reaching Multiple Sclerosis Disability Milestones In Recent Decades: A Nationwide Population-Based Cohort Study in Sweden. *JAMA Neurol*. 2019;76(6):665-671.
- Goodin DS, Reder AT, Ebers GC, et al. Survival in MS: a randomized cohort study 21 years after the start of the pivotal IFNβ-1b trial. *Neurology*. 2012;78(17):1315-1322.
- Maxwell SE, Kelley K, Rausch JR. Sample size planning for statistical power and accuracy in parameter estimation. *Annu Rev Psychol*. 2008;59:537-563.
- Giordano A, Uccelli MM, Pucci E, et al. The Multiple Sclerosis Knowledge Questionnaire: a self-administered instrument for recently diagnosed patients. *Mult Scler*. 2010;16(1):100-111.
- Farran N, Ammar D, Darwish H. Quality of life and coping strategies in Lebanese Multiple Sclerosis patients: A pilot study. *Mult Scler Relat Disord*. 2016;6:21-27.
- Hudaif HSA, Bwardi NA, Kojan S. Assessment of multiple sclerosis awareness and knowledge among the Saudi population in Riyadh City. *Mult Scler Relat Disord* 2014; 3(6): 758.
- Alotaibi FF. Assessment of knowledge and attitude of women in Majmaah city, Saudi Arabia about multiple sclerosis, 2016. *J Neurol Neurophysiol* 2016; 26.1: 77-84.
- Bhagavathula AS, Aldhaleei WA, Rahmani J, Mahabadi MA, Bandari DK. Knowledge and Perceptions of COVID-19 Among Health Care Workers: Cross-Sectional Study. *JMIR Public Health Surveill*. 2020;6(2):e19160.
- Arhan E, Serdaroglu A, Soysal S, Ozcelik A, Gucuyener K, Demir E. Assessment of mothers' knowledge and perceptions of electroencephalography and determination of the short-term effect of an informational leaflet. *Epilepsy Behav*. 2009;15(4):491-495.