



Caregivers' Preferences of COVID-19 Vaccination for Children: A Cross-sectional Study From Rural South India

Bakıcıların Çocuklar için COVID-19 Aşısı Tercihleri: Güney Hindistan Kırsalından Kesitsel Bir Çalışma

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ABSTRACT

Objective: This study aimed to document caregivers' perceptions and preferences regarding coronavirus disease-19 (COVID-19) vaccination among children.

Methods: This cross-sectional study analyzed 272 caregivers with 347 children (aged 1-18 years) attending a subdistrict rural hospital in February-March 2022.

Results: Vaccine acceptance was high (93.4%). Although fear of side effects was the most common reason not to vaccinate, a higher proportion of caregivers willing to vaccinate children had consulted healthcare personnel to clarify queries related to side effects. Familiar vaccination sites, where children had previously received routine immunization (RI), such as government hospitals, and Anganwadis (community-based childcare centers) where vaccines were available free of cost on all working days, were the most preferred for COVID-19 vaccination, followed by schools. Only 5.5% of the caregivers preferred private hospitals. Vaccination at home was desired for chronically ill and out-of-school children. RI as per age was associated with the willingness to vaccinate. In addition to protection from COVID-19, other benefits identified by willing parents were being able to attend schools, recreation, and travel.

Conclusions: Out-of-school children, children left or missed out in RI, and children with chronic illness can be at risk of being left out for COVID-19 vaccination and can be included by expanding vaccination services house-to-house as in adults. Media engagement and communication must be interactive to address issues, such as fear of side effects, and promote additional benefits of vaccination.

Keywords: COVID-19, vaccine hesitancy, routine immunization

ÖZ

Amaç: Bu çalışma, bakıcıların çocuklar için koronavirus hastalığı-2019 (COVID-19) aşılmasına ilişkin algı ve tercihlerini belgelemeyi amaçlamıştır.

Yöntemler: Bu kesitsel çalışmada, Şubat-Mart 2022 tarihleri arasında kırsal bir bölgedeki hastaneye başvuran 347 çocuğun (1-18 yaş arası) 272 bakıcısı incelendi.

Bulgular: Aşı kabul oranı yüksekti (%93,4). Yan etki korkusu aşılatmanın en yaygın nedeni olmasına rağmen, çocukları aşılatmak isteyen bakıcıların yüksek bir oranı yan etkilerle ilgili soruları netleştirmek için sağlık personeline danışmıştır. Devlet hastaneleri gibi çocukların daha önce rutin aşı (RI) oldukları tanıdık aşılama yerleri ve aşıların tüm iş günlerinde ücretsiz olarak sunulduğu Anganwadis (topluluk temelli çocuk bakım merkezleri) ve ardından okullar COVID-19 aşısı için en çok tercih edilen yerlerdi. Bakıcıların sadece %5,5'i özel hastaneleri tercih ettiler. Kronik hasta ve okula gitmeyen çocukların evde aşılanması istendi. Yaşa göre RI, aşılatma isteği ile ilişkilendirildi. COVID-19'dan korunmaya ek olarak, aşılatmaya istekli ebeveynlerin diğer tercih nedenleri çocukların aşı sonrası okula, eğlenceye ve seyahate devam edebilmeleriydi.

Sonuçlar: Okula gitmeyen çocuklar, IR'de bırakılan veya gözden kaçan çocuklar ve kronik hastalığı olan çocuklar COVID-19 aşısı açısından dışlanma riski altında olabilirler ve yetişkinlerde olduğu gibi evde aşılama hizmetleri genişletilerek dahil edilebilirler. Medya katılımı ve iletişim ile, yan etki korkusu gibi sorunlar ele alınıp, aşılanmanın ek faydaları teşvik edilebilir.

Anahtar kelimeler: COVID-19, aşı tereddütü, rutin immünizasyon

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INTRODUCTION

As of March 2022, the coronavirus disease-2019 (COVID-19) pandemic has brought about over 5.5 million deaths, among 440 million confirmed cases worldwide. We have retaliated by administering more than 10 billion vaccine doses so far¹. As adult vaccination is progressing, countries are expanding the umbrella of vaccine-induced protection to other groups such as pregnant women, adolescents, and other children.

India has started vaccinating children aged 15-18 years since January 3, 2022, and 12-14 years since March 16, 2022, and is looking forward to phased introduction in other age groups. As of March 2022, more than 50 million children aged 15-18 years have received the first vaccine dose, with an estimated vaccine coverage of >75%^{2,3}. Meanwhile, the only other injectable vaccine given in mass campaign mode to children in India has been measles rubella (MR) vaccine, which increased the MR vaccine coverage significantly from 52% to 83%⁴. On the contrary, full routine immunization coverage in children, which had plateaued around 65% in India, has increased only recently to >70% in most states⁵.

The most neglected populations in routine immunization include urban poor, tribal communities, and children with families hesitant to vaccination. Vaccination of children requires support of parents, caregivers, and media. Hence, it is important to document the concerns of caregivers and use the results of such a study to form the strategies of effective media engagement and communication. This study aimed to document caregivers' perceptions and preferences regarding COVID-19 vaccination in children.

MATERIALS and METHODS

This cross-sectional, observational study was conducted in the outpatient department (OPD) of a subdistrict rural hospital in south India. All adult patients attending the morning OPD of the hospital during the study period, with at least one child aged 1-18 years in the family, were invited to participate in the study. For this study, a caregiver was defined as a person who spent at least 2 h per day caring for a child aged 1-18 years in the same family. Outpatients brought in a state of emergency and patients whose other family members were already interviewed for this study were excluded. A total of 272 consenting caregivers participated in the study between February 17 and March 2, 2022.

A semi-structured questionnaire was used to collect data regarding sociodemographic details, routine immunization history of the child, caregivers' COVID-19

vaccination history, caregivers' responses/preferences regarding vaccination of the child including the felt need, barriers and facilitators, preferred place of vaccination, and concerns about COVID-19 vaccination (once it begins for the age group) that needed to be addressed by the healthcare system. The questionnaire was pretested in 35 participants before use.

Statistical Analysis

Data were entered and analyzed using Microsoft Excel⁶ and SPSS ver 23⁷. Data of caregivers who were willing and unwilling to vaccinate the children were analyzed separately using descriptive analysis and compared. Socioeconomic status of the study participants were determined using the modified B.G. Prasad classification for Indian families⁸.

Participant information sheet was given, and the study was explained to the study participants. Written informed consent was taken before interviewing the participants. The study was approved by the MVJ Medical College and Research Hospital Institutional Ethics Committee (no. MVJMC&RH/IEC-12/2022, dated 16th February 2022).

RESULTS

Among the 272 study participants, 70.5% (192) were parents of children aged 1-18 years. Other participants included grandparents (21) and parent's siblings (59). The study participants hailed from rural Bengaluru district, with 54.7% (160) from middle socioeconomic class. The 272 study participants had a total of 347 children. Majority of the children (35.4%) were 1-5 years old, 117 were 6-10 years old, 78 were 11-15 years old, and 29 were 15-18 years old. Approximately 48.4% (168) of the children were female.

Willingness to vaccinate the child: Among the 29 children aged 15-18 years, 24 had already been vaccinated against COVID-19 at the time of the study. Among the 272 caregivers interviewed, 18 (6.6%) were unwilling to get the children vaccinated (Table 1). This included 12 fathers, 5 mothers, and 1 paternal uncle of 8 girls and 15 boys. Among them were five caregivers who had two children each and were unwilling to vaccinate both their children. The major reasons for refusing vaccination was the fear of side effects in 13 participants and the belief that vaccination could cause COVID-19 in five participants. When the participants were asked about what side effects they anticipated following COVID-19 vaccination, seven participants named fever, swelling at the injection site, seizures, and cancer, whereas the other six participants did not specify the side effects that they anticipated, even

after probing. None of these 13 participants had consulted a health worker to clarify their doubts. Two participants also added that the vaccination was not necessary, and COVID-appropriate behaviors such as wearing mask and using hand sanitizers were more important.

Among 23 children whose caregivers were unwilling to have them vaccinated against COVID-19, 7 (30.4%) were partially immunized as per age with other routine childhood vaccines under the Universal Immunization Programme and one was not vaccinated at all. Four caregivers (22%) were not vaccinated against COVID-19. The reasons for not taking the vaccines were recent surgery (1) and fear of side effects, such as “allergy” (2) and “heart attack” (1). One participant also added that it was not necessary because of the reducing COVID-19 cases. The major sources of information were family and neighbors (8) and internet and social media (10). Eleven of these parents had high school education, and seven were graduates and belonged to middle socioeconomic class.

Driving forces for vaccination: Among the 254 caregivers who were willing to have their children vaccinated, 12 (4.7%) were illiterate, whereas the majority (197, 77.7%) had high school education. All caregivers were vaccinated, except for 7 (2.7%) caregivers, who gave reasons such as recent hospitalization (2), migration from other state (1), and fear of side effects (4). They were unsure of the nature of the side effects that might occur following COVID-19 vaccination. However, these seven unvaccinated caregivers were also willing to have their children vaccinated because they believed it was “necessary for children” and would be “given carefully to avoid side effects.”

The 247 vaccinated caregivers named multiple influences to get vaccinated, such as family and neighbors (37%), internet and mass media (29%), healthcare workers

(28%), and employers (16%). Majority of them (57%, 141) took vaccination from government primary health centers (PHCs). While approximately 22% of them were vaccinated (54) at their workplace, 35 (14%) in government outreach camps, and 17 (7%) in private hospitals.

Location preferred by the caregivers for the vaccination of children: The 254 (93.3%) caregivers who were willing to have their children vaccinated were asked about the location they preferred for vaccination. The majority of the caregivers (n=98, 38.5%) preferred to vaccinate their children in government PHCs or hospitals. Government PHC/hospitals were the preferred sites for parents of all socioeconomic classes, except those in the lower socioeconomic class (Table 2), though this difference was not significant (Fishers’ Exact p=0.383). The major reasons for preferring government PHC/hospitals were familiarity with the location (caregivers received vaccine there) (42), scheduled vaccination sessions on all days (37), availability of free vaccine (12), and having out-of-school children (7).

Other preferred sites were community-based childcare centers (“Anganwadis”; 25.9%) and schools (18.5%). Moreover, parents with more than one child preferred vaccinating them together; hence, caregivers of 27.5% of 116 children aged 1-5 years also preferred vaccination in the school and 22.4% in Anganwadis (Table 3). Caregivers of 8.3% of the 324 children (27) preferred to have them vaccinated at home for reasons such as fear of side effects occurring in school (11), avoid traveling to vaccination centers with a young child (6), having an out-of-school child (9), and children with chronic illness (one child with cerebral palsy).

Among the 324 children whose caregivers were willing to have them vaccinated against COVID-19, 86.7% (281) were vaccinated with routine immunization as per age and 13.3% (43) were partially vaccinated. A significantly

Table 1. Characteristics of caregivers (n=18) who were unwilling to vaccinate the children (n=23).

Age of the child	Sex		Routine immunization history of the child (n=23)				COVID-19 vaccination status of caregiver (n=18)			
	Female	Male	Not vaccinated at all	Partially vaccinated as per age	Vaccinated as per age	Total	None	One dose	Two dose	Total
1-5 years	3	4	1	1	5	7	2	1	3	6
6-10 years	2	4	0	3	3	6	0	0	4	4
11-15 years	2	7	0	2	7	9	2	1	4	7
15-18 years	1	0	0	1	0	1	0	1	0	1
Total	8	15	1	7	15	23	4	3	11	18

COVID-19: Coronavirus disease-2019

higher proportion of these children were vaccinated as per age, compared with children whose caregivers were unwilling to have them vaccinated (Fisher's Exact $p=0.011$).

Caregivers of approximately 26.3% (15) of the children who had been previously given routine immunization in private hospitals wanted to vaccinate their child for COVID-19 in schools, whereas 21% each wanted to have vaccinated in private hospitals and Anganwadis. Caregivers of approximately 39.8% and 33.8% of 118 children previously vaccinated (routine immunization) in Anganwadis wanted to have their children vaccinated in government PHC and Anganwadi, respectively. The majority (57%) of caregivers whose children had been given routine immunization in government PHC wanted the children to be vaccinated there itself. Thus, there was a preference toward vaccination providers, especially Anganwadis and government PHC/hospitals, which had given routine immunization to the child and thus provide COVID-19 vaccination as well (Figure 1).

Motivation for vaccination of children: Among the 254 caregivers who were willing to vaccinate the children, 76.7% (195) were willing to vaccinate their child because they believed that COVID-19 vaccine would prevent the disease. Approximately 54.7% (139) of the caregivers also said that COVID-19 vaccination was necessary for the

children to be allowed to school and travel. Approximately 56.7% (144) also said that even though the number of COVID-19 cases were declining, another "wave" of COVID-19 may occur; thus, vaccination of children is still important. The other 110 caregivers (43.3%) were unsure about the occurrence of an outbreak of COVID-19 but were still willing to vaccinate the children. Approximately 13.8% (35) of the caregivers reported having lost a family member to COVID-19 and wanted the children to be protected by vaccination.

When enquired about the possible side effects after COVID-19 vaccination, 92.9% (236) knew that COVID-19 vaccination might cause fever and pain but believed that they were not life-threatening. The proportion of participants with knowledge regarding possible side effects was significantly higher in this group than in caregivers unwilling to vaccinate the children (Fisher's Exact $p=0.011$). While 213 (83.9%) had heard about side effects from family and neighbors, 197 (77.6%) also named mass media and internet as sources. Approximately 13.7% (35) had heard from neighbors and social media that COVID-19 vaccine caused infertility, and 16 of them clarified that it was not true by consulting a doctor, whereas 19 had dismissed it as a rumor. Approximately 2.3% (6) the caregivers named "heart attack" and "death" as possible side effects and believed that it occurred only in older people.

Table 2. Location preferred for vaccination of children by the caregivers of different socioeconomic status (Modified B.G Prasad classification) (n=254).

Socioeconomic status	Anganwadi	Government PHC/hospital	Private hospital	Home	School	Total
Upper (%)	0 (0%)	2 (50%)	1 (25%)	0 (0%)	1 (25%)	4 (100%)
Upper middle (%)	2 (8.6%)	7 (30.4%)	4 (17.3%)	4 (17.3%)	6 (26%)	23 (100%)
Middle (%)	48 (30%)	59 (36.8%)	8 (5%)	10 (6.2%)	35 (21.8%)	160 (100%)
Lower middle (%)	8 (14.8%)	27 (50%)	3 (5.5%)	12 (22.2%)	4 (7.4%)	54 (100%)
Lower (%)	8 (61.5%)	3 (23%)	1 (7.6%)	0 (0%)	1 (7.6%)	13 (100%)
Total (%)	66 (25.9%)	98 (38.5%)	17 (6.6%)	26 (10.2%)	47 (18.5%)	254 (100%)

PHC: Primary health center

Table 3. Location preferred for vaccination by the caregivers of children of different age groups (n=324).

Age groups	Anganwadi	Government PHC/hospital	Private hospital	Home	School	Total
1-5 years (%)	26 (22.4%)	40 (34.4%)	13 (11.2%)	5 (4.3%)	32 (27.5%)	116 (100%)
6-10 years (%)	29 (26.1%)	51 (45.9%)	3 (2.7%)	10 (9%)	18 (16.2%)	111 (100%)
11-15 years (%)	25 (36.2%)	30 (43.4%)	2 (2.8%)	11 (15.9%)	1 (1.4%)	69 (100%)
15-18 years (%)	1 (3.5%)	21 (75%)	0 (0%)	1 (3.5%)	5 (17.8%)	28 (100%)
Total	81 (25%)	142 (43.8%)	18 (5.5%)	27 (8.3%)	56 (17.2%)	324 (100%)

PHC: Primary health center

Approximately 72.8% (185) of the caregivers said that they relied on schools and Anganwadis to give information about when and where to vaccinate the children. Approximately 46.8% of the caregivers (119) said that they relied on the internet and mass media for information. Another 37% (94) relied on local health care workers like Accredited Social Health Activists and auxiliary nurse midwives to inform them, and about

35% (89) said that they would get the information from neighbors and friends.

When enquired about any additional information they required about the vaccine from the vaccine provider before childhood vaccination, 37.8% (96) did not answer. Additional information requested by other caregivers is provided in Figure 2.

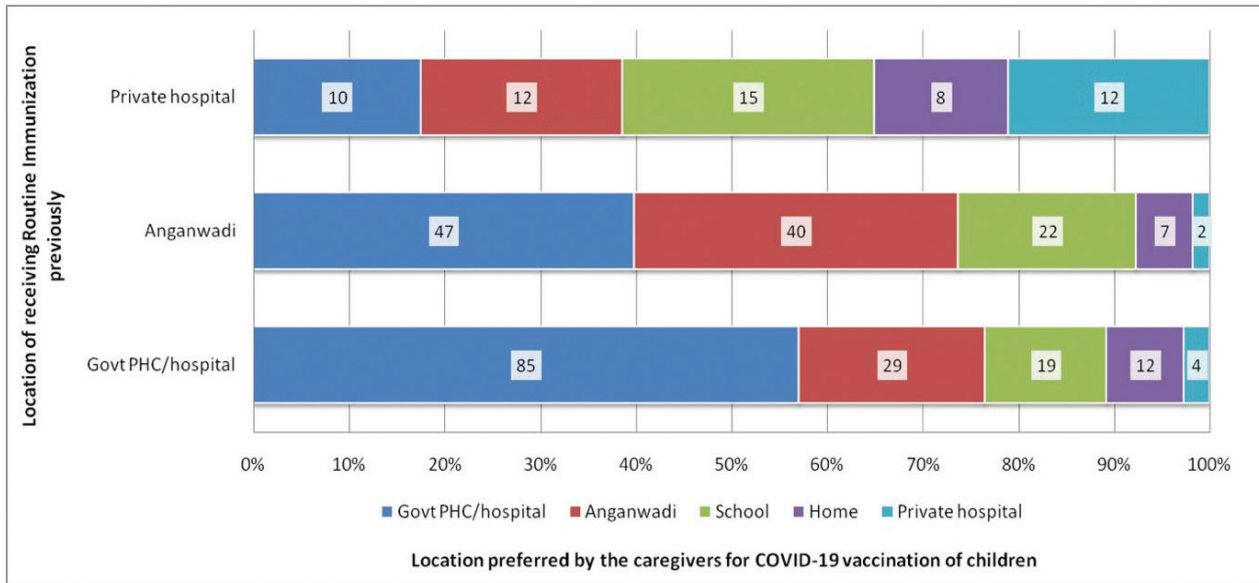


Figure 1. Location preferred by caregivers for COVID-19 vaccination of children compared with previous routine immunization provider.

COVID-19: Coronavirus disease-2019, PHC: Primary health center

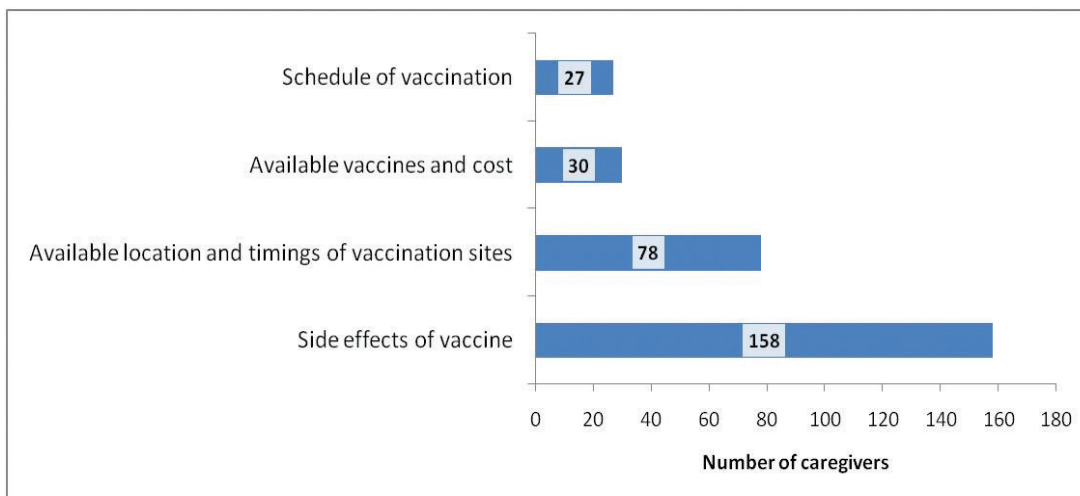


Figure 2. Information sought and preferred by caregivers regarding COVID-19 vaccination.

COVID-19: Coronavirus disease-2019

DISCUSSION

In this study, 272 caregivers in a rural Indian setting were interviewed regarding their intention to vaccinate 347 children in their families, aged 1-18 years against COVID-19. Childhood vaccine acceptance was 93.4% among caregivers. An online study of pregnant mothers and mothers of young children conducted in 2020, before the introduction of vaccines for children, reported that vaccine acceptance for children could be as high as 85% in India⁹. In this study, vaccine hesitancy was lower than that reported in other countries, which were conducted when the vaccines had just been rolled out for emergency use^{10,11}. As vaccination is being introduced in different age groups, we might be optimistic about parents' eagerness to get their child vaccinated against a pandemic, such as COVID-19. However, a considerable proportion of children who, despite being most vulnerable, are at risk of being left out. Several factors such as the type of vaccine, age and comorbidities in the child, parents' vaccination status, and completion of other childhood vaccination as per schedule have been reported to influence parent's acceptability^{12,13}.

Similar to other vaccines in the past¹⁴, fear of side effects was the basis of vaccine hesitancy in approximately 72% of caregivers who were unwilling to vaccinate the children. However, a significantly higher percentage of participants willing to vaccinate the children had knowledge regarding the side effects of the vaccine, compared with those unwilling. Interestingly, multiple sources such as the family, neighbors, internet, and mass media were the major sources of information in both groups. However, a higher proportion of caregivers willing to vaccinate the children had consulted healthcare personnel to clarify queries related to side effect. In this study group, the most sought-after information regarding COVID-19 childhood vaccination was regarding side effects. Thus, effective communication platforms for parents to interact with healthcare workers regarding the safety of COVID-19 vaccination, through mass media, social media, and schools must be established.

Caregivers were also found to prefer familiar sites and where vaccine was available free of cost on all working days such as government hospitals and Anganwadis, where the children had received routine immunization, for COVID-19 vaccination. Schools were also preferred sites, especially among caregivers with more than one child. However, only 5.5% of the caregivers preferred private hospitals. Some parents preferred vaccination at home, especially for children who were chronically ill. Caregivers should be given options of vaccination centers to choose from, and vaccination at home should be also

considered for children who are chronically ill and out of school.

The uptake of routine immunization for children could be predictive of COVID-19 vaccine acceptance^{13,15}. In this study, a significantly higher proportion of children (whose caregivers were willing to vaccinate them against COVID-19) were vaccinated with routine immunization as per age, compared with children whose caregivers were unwilling to vaccinate them. Thus, specific strategies to reach children who were left out or missed routine vaccination should be designed.

As in some other studies, willing caregivers envisaged several benefits of COVID-19 vaccination, other than protection from the infection, such as attending schools, recreation, and travel¹⁶. These benefits can be highlighted to encourage vaccine acceptance, especially when the incidence of COVID-19 is low.

The sample is not representative of the population. However, it shows the presence of vaccine hesitancy in the targeted population. Although most of the caregivers with hesitancy were educated and belonged to middle socioeconomic class in this study, vaccine hesitancy in different educational or socioeconomic groups could not be compared.

CONCLUSION

Caregiver's acceptance of COVID-19 vaccination was high. Preferred locations for vaccination were government PHC/hospitals, Anganwadis, and schools, compared with private hospitals. Children who were out of school, left out or missed out in routine immunization, and those who were chronically ill can be at risk of being missed out for COVID-19 vaccination, but they can be included by expanding vaccination services house-to-house as in adults. Media engagement and communication must be made interactive to address issues such as fear of side effects and promote additional benefits of vaccination.

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Ethics

Ethics Committee Approval: The study was approved by institutional Ethics Committee of MVJ Medical College and Research Hospital (no. MVJMC&RH/IEC-12/2022, dated 16/02/2022).

Informed Consent: Written informed consent was taken before interviewing the participants.

Peer-review: Externally and internally peer-reviewed.

Author Contributions

Surgical and Medical Practices: U.C.S., B.B., M.S., M.G., Concept: U.C.S., B.B., M.S., M.G., Design: U.C.S., B.B., M.S., M.G., Data Collection and/or Processing: U.C.S., B.B., M.S., M.G., Analysis and/or Interpretation: U.C.S., B.B., M.S., M.G., Literature Search: U.C.S., B.B., M.S., M.G., Writing: U.C.S., B.B., M.S., M.G.

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