म0प्र0 भोज (मुक्त) विश्वविद्यालय

राजा भोज मार्ग, (कोलर रोड)–462016 (म0प्र0)

अकादमिक काउंसिल की बैठक
दिनाक 26 सितम्बर, 2019 समय 3.00 बजे

: कार्यवृत्त :

विश्वविद्यालय की अकादमिक काउंसिल की बैठक बोर्ड रूम में आज दिनाक 26 सितम्बर, 2019 को 3.00 बजे माननीय कुलपतिजी की अध्यक्षता में सम्पन्न हुई जिसमें निम्नांकित सदस्य उपस्थित हुए ।

1) **प्रो0 (डॉ0) जयन्त सोनवलकर**
कुलपति, म0प्र0 भोज (मुक्त) विश्वविद्यालय, भोपाल ।

2) **डॉ.एल.पी.झारिया**
क्षेत्रीय निदेशक भोपाल एंव विद्यार्थी सहायता
म0प्र0 भोज (मुक्त) विश्वविद्यालय, भोपाल ।

3) **डॉ. विभा मिश्रा,**
निदेशक अकादमिक
म0प्र0 भोज (मुक्त) विश्वविद्यालय, भोपाल ।

4) **डॉ. सचिन शर्मा**
क्षेत्रीय निदेशक
म0प्र0 भोज (मुक्त) विश्वविद्यालय, इन्दौर ।

5) **डॉ. सुमैर सिंह सौलंकी**
उप क्षेत्रीय निदेशक
म0प्र0 भोज (मुक्त) विश्वविद्यालय, बडवानी ।

6) **डॉ. हेमलता दिनकर**
व्याख्याता, शिक्षा विभाग
म0प्र0 भोज (मुक्त) विश्वविद्यालय, भोपाल ।

7) **डॉ. कंचन जिज्ञासी**
रीडर ,बहुमाध्यमीय शिक्षा विभाग
म0प्र0 भोज (मुक्त) विश्वविद्यालय, भोपाल ।

8) **डॉ. नीलम वासनिक**
मुद्रण वितरण
म0प्र0 भोज (मुक्त) विश्वविद्यालय, भोपाल ।

9) **डॉ. एच.एस.त्रिपाठी**
कुलसचिव
म0प्र0 भोज (मुक्त) विश्वविद्यालय, भोपाल ;

म.प्र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड)
भोपाल

मूकमाटी पुस्तक के लेखन कार्य का संपादन का कार्य प्रो. के.एन गोस्वामी के द्वारा कर मुदण एंव वितरण विभाग को प्रस्तुत किया है। उक्त मूकमाटी प्रश्न–पत्र को सूरदास/निराला के साथ एक वैकल्पिक विषय के रूप मे एम.ए हिन्दी पूर्वाद्व हिन्दी साहित्य में सम्मिलित करने हेतु विचारार्थ प्रस्तुत ।

निर्णय– मूकमाटी प्रश्न–पत्र को सूरदास/निराला के साथ एक वैकल्पिक विषय के रूप मे एम. ए हिन्दी पूर्वाद्व हिन्दी साहित्य मे सम्मिलित करने का अनुमोदन किया गया ।

बिन्दु क्रमांक–(12) विश्वविद्यालय में नये अध्ययन क्रेन्द खोलने संबंधी ।

निर्णय– सिद्वी विनायक महाविद्यालय जगमल ब्यौहारी, शाहडोल, जिला – रीवा एंव पंडित रामसुंदर शुक्ला शिक्षा एंव प्रशिक्षण संस्थान पहाड़िया जिला रीवा में डी.एल.एड़ पाठ्यक्रम के संचालन हेतु अनुमोदन प्रदान किया गया ।

बिन्दु क्रमांक–(13) **विश्वविद्यालय में प्रचलित बी.ए., बी.एससी. एवं बी.कॉम के अध्यादेश (क्रमांक 8,9 एवं 10) में संशोधन बाबत।**

विश्वविद्यालय मे प्रचलित अध्यादेश क्रमांक 8,9 एवं 10 जो क्रमशः बी.ए., बी.एससी. एवं बी.कॉम के है, जिसके प्रावधानानुसार विद्यार्थियों को पूरक परीक्षा पास करने हेतु केवल एक अवसर प्रदान किया जाता है, जोकि दूरस्थ शिक्षा पद्वति के विपरीत है। अतः पूरक परीक्षा में विद्यार्थियों को उनके पाठ्यक्रम के पंजीयन काल तक अवसर प्रदान किये जाने हेतु निम्नानुसार प्रस्ताव अकादमिक काउंसिल के समक्ष अनुमोदनार्थ प्रस्तुत।

अध्यादेश का विद्यमान प्रावधन	अध्यादेश का प्रस्तावित प्रावधन	प्रस्ताव का औचित्य
5	6	7
Ordinance No. 8 (B.A.) ....There shall be a supplementary examination giving only one chance to candidates who failed in only one subject.	**Ordinance No. 8 (B.A.)** Candidate will be given Chance to pass the subject of the supplementary until the maximum period of regisiration in the course.	वर्तमान मे विधार्थी को सप्लीमेंट्री हेतु एक अवसर दिया जाता है। जो कि दूरस्थ शिक्षा पद्धति के विपरीत है। अतः परिवर्तन किया जाना प्रस्तावित।

म0प्र0 भोज (मुक्त) विश्वविद्यालय

राजा भोज मार्ग, (कोलर रोड)–462016 (म0प्र0)

अध्ययन मण्डल की बैठक

दिनाक् 08 जनवरी, 2020 समय 3.00 बजे

: कार्यवृत्त :

अध्ययन मण्डल के(18) विभागो की संयुक्त बैठक दिनॉक 08/01/2020 को अपराह्न 12.00 बजे स्थान बोर्ड रूम में आयोजित की गयी है।बैठक में निम्न सदस्य उपस्थित हुये ।

- डॉ0 ए0 के0 त्रिपाठी, निदेशक, प्रवेश एंव मूल्यांकन, म0प्र0भोज0 मुक्त वि0वि, भोपाल ।
- डॉ0 विभा मिश्रा, निदेशक अकादमिक, म0प्र0भोज0 मुक्त विश्वविद्यालय, भोपाल ।
- डॉ0 एल0पी0झारिया, निदेशक एंव विद्यार्थी सहायता, म0प्र0भोज0 मुक्त वि0वि, भोपाल ।
- डॉ0 नीलम वासनिक, सहा0 निदेशक, मुद्रण वितरण, म0प्र0भोज0 मुक्त वि0वि, भोपाल ।
- डॉ0 शैलेन्द कौशिक, सहा0 निदेशक, विद्यार्थी सहायता, म0प्र0भोज0 मुक्त वि0वि, भोपाल ।
- डॉ0 एन0आर0दास, सहा0प्राध्यापक, उच्च शिक्षा उत्कृष्टता संस्थान, भोपाल ।
- डॉ0 अनिल राजपूत, शासकीय स्नातकोत्तर महाविद्यालय, सीहोर ।
- डॉ0 पियूष भटनागर, एसोसिएट प्रोफेसर, एम0एल0बी कॉलेज, भोपाल ।
- डॉ0 ए0जेड0खान,प्लेसमेंट ऑफिसर, म0प्र0भोज0 मुक्त विश्वविद्यालय, भोपाल ।
- डॉ0 दिनेश नागर, प्राध्यापक, बरकतउल्ला विश्वविद्यालयए भोपाल ।
- डॉ0 ममता चंसौरिया, प्राध्यापक,एम0एल0बी कॉलेज, भोपाल ।
- डॉ0 अजय प्रकाश खरे प्राध्यापक, उच्च शिक्षा उत्कृष्टता संस्थान, भोपाल।
- डॉ0 आर0एस0पाण्डेय,सेवानिवृत्त,वेदवती कॉलोनी अमरावती खुर्द,भोपाल ।
- डॉ0 मधु जैन, सहा0 प्राध्यापक उच्च शिक्षा उत्कृष्टता संस्थान, भोपाल।
- डॉ0 धर्मेन्द पारे, प्राध्यापक, हमीदिया आर्ट्स एड कॉमर्स कॉलेज, भोपाल ।
- डॉ0 के0जी0मिश्रा, प्राध्यापक,शासकीय नर्मदा कॉलेज, होशंगाबाद ।
- डॉ0 एच0आर0रैदास, प्राध्यापक, हमीदिया आर्ट्स एंड कॉमर्स कॉलेज, भोपाल ।
- डॉ0 रोशन बेंजामिन खान, प्राध्यापक अंगेजी, इन्दौर ।
- डॉ0 विकास जाऊलकर, प्राध्यापक, हमीदिया आर्ट्स एंड कॉमर्स कॉलेज, भोपाल
- डॉ0 बी0के0सिन्ह, प्राध्यापक, उच्च शिक्षा उत्कृष्टता संस्थान, भोपाल।
- डॉ0 सुनील पाठक, सहा0 प्राध्यापक, शासकीस पी0जी0 कॉलेज धार ।
- डॉ0 मधुरी लता दुबे, प्राध्यापक, बेनज़ीर कॉलेज,भोपाल ।
- डॉ0 साधना सिंह, सहा0प्राध्यापक, बी0एस0एस0कॉलेज भोपाल ।
- डॉ0 ज्योति पाराशर, व्याख्यात, म0प्र0भोज0 मुक्त विश्वविद्यालय, भोपाल ।
- डॉ0 हेमलता दिनकर, विभागाध्यक्ष, शिक्षा विभाग,म0प्र0 भोज (मुक्त) विश्वविद्यालय, भोपाल ।
- डॉ0 कंचन जिज्ञासी, रीडर ,बहुमाध्यमीय शिक्षा विभाग, म0प्र0भोज0 मुक्त वि0वि, भोपाल ।

कुलसचिव
म.प्र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड)
भोपाल

	5. Dr Sabhakant Dwivedi Professor, Institute f or Excellence in Higher Education, Bhopal. 6. Dr Manoj Shukla Professor Institute f or Excellence in Higher Education, Bhopal. 7. Dr Praveen Chand Tamot Professor, Department of Zoology MLB College Bhopal 8. Dr Pratima Khare Associate Professor Department of Zoology Govt Girls College Sehore. 9. Dr H.S.Dwivedi Professor Madhav Science College, Ujjain. 10. Dr Pratibha Singh Professor Sarojini Naidu Girls (Autonomous) PG College Bhopal.
17.Department of Social Work	1. Dr Arti Shrivastava, Associate Professor Department of Sociology Sarojini Naidu Girls (Autonomous) PG College Bhopal. 2. Dr Ranjana Shrivastav Professor, Department of Sociology MLB College, Bhopal
18. Department of Special Education	1. Dr Amitav Mishra, Professor(Special education), Indira Gandhi National (Open) University, New Delhi. 2. Dr Indra Bhushan Assistant Professor Composite Regional Centre for Persons with Disabilities, (Divyangjan) Bhopal.

कुलसचिव
रा.र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड)
भोपाल

म0प्र0 भोज (मुक्त) विश्वविद्यालय

राजा भोज मार्ग, (कोलार रोड)–462016 (म0प्र0)

अकादमिक काउंसिल की बैठक दिनांक 10/05/2022

कार्यवृत्त (संशोधित)

बिन्दु क्रमांक–(1) अकादमिक काउंसिल बैठक दिनांक 10/09/2020 के कार्यवृत्त का अनुमोदन ।

निर्णय– कार्यवृत्त का अनुमोदन किया गया ।

बिन्दु क्रमांक–(2) परिनियम क्रमांक–12 अकादमिक काउंसिल की कंडिका 6 के प्रावधानानुसार सदस्यों को नामकित किये जाने संबंधी।

म0प्र0भोज (मुक्त) विश्वविद्यालय के परिनियम क्रमांक–12 अकादमिक काउंसिल में निम्नानुसार प्रावधान है। Not more than Five Persons who are not employees of the University, Co-opted by the Academic Council for their special Knowledge in the field of Industries, Trade and Commerce, Academic and Professional Organizations, Communication etc.

निर्णय– परिनियम 12 की कंडिका 6 के प्रावधानानुसार निम्नांकित तीन सदस्यों को अकादमिक काउंसिल में निम्नानुसार सहयोजित किया गया ।

Not more than Five Persons who are not employees of the University, Co-opted by the Academic Council for their special Knowledge in the field of Industries, Trade and Commerce, Academic and Professional Organizations, Communication etc.	1	कुलपति – अम्बेडकर मुक्त वि0वि0, अहमदाबाद, गुजरात।
	2	कुलपति– माखनलाल चतुर्वेदी, पत्रकारिता विश्वविद्यालय भोपाल।
	3	क्षेत्रीय निदेशक – इंदिरा गांधी राष्ट्रीय मुक्त विश्वविद्यालय भोपाल।
	4	
	5	

समस्त सदस्यों द्वारा सर्वसम्मति से निर्णय लिया गया कि, अन्य दो सदस्यों हेतु विश्वविद्यालय के कुलपति को अधिकृत किया गया कि वे इस हेतु सदस्यों का मनोनयन करें।

बिन्दु क्रमांक–(3) म0प्र0शासन उच्च शिक्षा विभाग के द्वारा गठित केन्द्रीय अध्ययन मण्डल द्वारा स्नातक (प्रथम वर्ष) के पाठयक्रम का निर्धारण नई शिक्षा नीति 2020 के आधार पर किया गया है।

(1) म0प्र0उच्च शिक्षा विभाग द्वारा राष्ट्रीय शीक्षा नीति 2020 के स्नातक पाठयक्रमो हेतु अध्यादेश 14ए तथा 14बी पर मान कुलाधिपति द्वारा विश्वविद्यालय समन्वय समिति के अनुसमर्थन की प्रत्याक्षा में अनुमोदन प्रदान किया गया है। एवं शासन द्वारा वि0वि0 में संबंधित पाठयक्रम अंगीकृत किये जाने के संबंधमें निर्देश दिये है अत: वि0वि0 दूरस्त शिक्षा पद्धति से प्रस्तावित समस्त स्नातक पाठयक्रम हेतु अध्यादेश 14ए तथा 14बी को यथावत सत्र 2023–24 से अपनाये जाने हेतु प्रस्तावित है ।

(2) स्वअधिगम पाठ्यसामग्री को ध्यान में रखते हुये वर्तमान शैक्षाणिक सत्र 2022–23 में प्रचालित पाठयक्रमो को CBCS में परिवर्तित किया गया ।

कुलसचिव
म.प्र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड)
भोपाल

(3) नई शिक्षा नीति के आधार पर निर्मित पाठ्यक्रमों को विश्वविद्यालय में शैक्षणिक सत्र 2023–24 से यथावत रूप से अपनाये जाने हेतु प्रस्तावित है ।

(4) केन्द्रीय अध्ययन मण्डल बोर्ड द्वारा समस्त पाठ्यक्रमों के अंको का निर्धारण 75 प्रतिशत सैद्धांतिक, 25 प्रतिशत अन्य मूल्यांकन/क्लास टेस्ट असाइनमेंट/प्रस्तुतीकरण (प्रेजेंटेशन)के लिये निर्धारित किये गये । किन्तु विश्वविद्यालय द्वारा अंक निर्धारण 75 प्रतिशत सैद्धांतिक एवं 25 प्रतिशत सत्रीय कार्य हेतु किये जाने की अनुशंसा की जाती है ।

(5) वर्तमान सत्र 2021–2022 गणित तथा रसायन शास्त्र के विद्यार्थियों को केवल Major Subject को ही लिये जाने संबंधी अनुशंसा ।

(6) विश्वविद्यालय में वर्तमान सत्र 2022–23 एवं आगामी शैक्षाणिक सत्र हेतु स्नातक प्रथम वर्ष के समस्त विषयो हेतु अध्ययन मण्डल की बैठक की गयी समस्त अध्ययन मण्डल की बैठक दिनॉक 05/10/2021, 06/10/2021, 11/10/2021, 12/10/2021 एवं 12/11/2021 तथा अध्ययन मण्डल की बैठक दिनाँक 10/11/2020, 11/11/2020, 17/11/2020, 18/11/2020 12/03/2021 के कार्यवृत्त का अनुमोदन।

निर्णय– बिन्दु क्रमांक 3 (1) चूकि भोज वि0वि0 दूरस्थ शिक्षा के क्षेत्र में कार्यरत है। अतः म0प्र0 उच्च शिक्षा विभाग द्वारा राष्ट्रीय शिक्षा नीति 2020 के परिपालन में इसका विशेष ध्यान रखा जाए। सभी बिन्दुओं को सिद्धांततः अनुमोदित किया गया।

बिन्दु क्रमांक–(4) विश्वविद्यालय द्वारा Apprenticeship Embedded Degree Programs हेतु बी0ए,बी0बी0ए एवं बी0कॉम के अध्ययन मण्डलो की बैठक दिनाँक 05/10/2021, 06/10/2021, 11/10/2021, 12/10/2021 एवं 12/11/2021 के कार्यवत्त का अनुमोदन ।

निर्णय– अनुमोदित ।

बिन्दु क्रमांक–(5) विश्वविद्यालय द्वारा निम्नालिखित शोध पीठ का गठन किया गया ।

(1) राजा भोज शोध पीठ
(2) गाँधी शोध पीठ
(3) जनजाति शोध पीठ

राजा भोज शोध पीठ एवं गाँधी शोध पीठ की बैठक दिनाँक 22/02/2022 के कार्यवृत्त का अनुमोदन ।

राष्ट्रीय जनजाति आयोग नई दिल्ली के साथ MOU सम्पन्न किया गया है तथा विश्वविद्यालय में जनजाति शोध पीठ की स्थापना की गयी है जिसका विस्तृत प्रस्ताव संलग्न है इस शोध पीठ के द्वारा जनजाति संबंधित विषयो पर शोध एवं शिक्षण/ प्रशिक्षण के माध्यम से सामजिक अर्थिक व संस्कृतिक विरासत को संजोने व बढाने हेतु कार्य करेगी तथा विद्यार्थियों को Internship/Training विभिन्न समन्सामयिक ग्रामीण एवं आदिवासी विषयो पर प्रदान की जायेगी ।

निर्णय– अनुमोदित ।

म.प्र. भोज (मुक्त, विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड़)
भोपाल

बिन्दु क्रमांक–(6) विश्वविद्यालय द्वारा Gandhian Studies पर प्रमाण पत्र पाठ्यक्रम प्रारंभ किये जाना प्रस्तावित है ।

निर्णय– प्रस्ताव अनुमोदित किया गया ।

बिन्दु क्रमांक–(7) सांची विश्वविद्यालय द्वारा संचालित विभिन्न शैक्षाणिक पाठ्यक्रमों को विश्वविद्यालय से MOU हस्ताक्षरित किया गया इस MOU के तहत पाठ्यक्रमों को प्रारंभ किये जाने की अनुशंसा (सांची विश्वविद्यालय द्वारा पाठ्यक्रमो को यथावत लागू किये जाने की अनुशंसा की जाती है सूची संलग्न है ।

S.No	Department	Advanced Certificate Courses/CBCS/Open for all (Duration 06 Months)	
1	Hindi		
2	Sanskrit	Written & Spoken Sanskrit	
3	Vedic Studies	Introduction to Vedas	
4	Chinese Language	Chinese Language	
5	Indian Philosophy	Indic Philosophy Indian Cultural Heritage	03 Credits
6	Yoga	Ayurvedic Dietetics Introduction to Yoga Nidra	
7	Alternative Education	Indian Education & Holistic Development	
8	Library	Basis of Intellectual Property Rights	

निर्णय– अनुमोदित ।

बिन्दु क्रमांक–(8) विश्वविद्यालय द्वारा Bachelor's Preparatory Programme को विश्वविद्यालय में प्रारंभ किये जाने की अनुशंसा ।

निर्णय– इग्नू के Bachelor's Preparatory Programme को यथावत लागू किये जाने की अनुशंसा की जाती है ।

बिन्दु क्रमांक–(9) दिल्ली बोर्ड ऑफ स्कूल शिक्षा के उत्तीर्ण विद्यार्थियों को म0प्र0भोज (मुक्त) विश्वविद्यालय के संचालित पाठ्यक्रमो में प्रवेश हेतु समतुल्य मान्यता देने संबंधी प्रस्ताव अकादमिक कांउसिल के समक्ष सूचना ग्रहण करने संबंधी ।

निर्णय– अकादमिक कांउसिल द्वारा सूचना ग्रहण की गयी ।

बिन्दु क्रमांक–(10) Board of Open Schooling & skill Education (BOSSE) के उत्तीर्ण विद्यार्थियों को पत्रतानुसार म0प्र0भोज (मुक्त) विश्वविद्यालय के संचालित पाठ्यक्रमों में प्रवेश हेतु पात्रता दिये जाने संबंधी प्रस्ताव अकादमिक कांउसिल के समक्ष सूचना ग्रहण करने संबंधी ।

निर्णय– अकादमिक कांउसिल द्वारा सूचना ग्रहण की गयी ।

बिन्दु क्रमांक–(11) म0प्र0शासन उच्च शिक्षा विभाग के द्वारा गठित केन्द्रीय अध्ययन मण्डल के द्वारा 25 व्यावसायिक पाठ्यक्रमों के पाठ्यक्रम बनाये गये है । म0प्र0भोज (मुक्त) वि0वि0 द्वारा इन विषयो में प्रमाण पत्र कार्यक्रमो को प्रारंभ किया जाना है अतः उच्च शिक्षा विभाग द्वारा निर्मित व्यावसायिक पाठ्यक्रमों को यथावत रूप से स्वीकार करने एवं सत्र 2022–23 से प्रारंभ किये जाने की अनुमति हेतु प्रस्तुत है संलग्न सूची ।

कुलसचिव
म.प्र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड़)
भोपाल

	व्यवसायिक पाठ्यक्रम
क्र.	विषय
1.	सौंदर्य और स्वास्थ्य कल्याण
2.	निर्यात आयात प्रबंधन (Export Import Management)
3.	जीएसटी के साथ ई– एकाउंटिंग और कराधन (E-Accounting and Taxation with GST)
4.	वित्त सेवाएं और बीमा (Finance Services and Insurance)
5.	खुदरा प्रबंध (Retail Management)
6.	डिजिटल मार्केटिंग (Digital Marketing)
7.	बिक्री कौशल(Salesmanship)
8.	अकाउंटिंग और टैली कोर्स (Accounting and tally)
9.	डेस्कटॉप प्रकाशन (डीपीटी) (Desktop Publishing DTP)
10	वेब डिजाइनिंग (Web Designing)
11	हस्तशिल्प (Handcrafts)
12	खाद्य संरक्षण और प्रसंस्करण (Food Preservation and Processing)
13	सुरक्षा सेवाएं (Security Services)
14	कार्यालय प्रक्रिया और व्यवहार (Office Procedure and Practices)
15	व्यक्तिगत विकास (Personality Development)
16	पर्यटन परिवहन और यात्रा सेवाएं (Tourism transport and travel services)

निर्णय– अनुमोदित।

अध्यक्ष की अनुमति से अन्य बिन्दु

बिन्दु क्रमांक–(12) विश्वविद्यालय की अकादमिक काउन्सिल की बैठक दिनांक 27 दिसम्बर 2019 के समक्ष वि0वि0 के आदेश क्रमांक 2360/स्था/म0प्र0भो0वि0वि0/2019 द्वारा गठित समिति की अनुशंसा के अनुसार परिनियम–8 में नवीन स्कूल जोड़ना प्रस्तावित किया गया था।

निर्णय– अकादमिक परिसर के द्वारा चर्चा उपरांत निम्नानुसार अकादमिक एवं प्रशासनिक विभागों का अनुमोदन किया गया।

कुलसचिव
म.प्र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड)
भोपाल

1. अकादमिक विभाग

S.No.	University Teaching Departments (UTDs)		Remarks
1	School of Sciences		
2	School of Social Sciences		
3	School of Commerce		
4	Bhoj Institute of Management Studies		
5	School of Education	General Education	
		Special Education	
6	School of Library Science		
7	School of Journalism & Media		
8	School of Humanities & Languages		
9	School of Computer Science & Information Technology		
	Research Institution in ODL		
10	Institute of Training and Development		

2. प्रशासनिक विभाग

S.No.			Remarks
1	Department of Center Development Council		
2	Department of Student support/ Welfare Grievance		
3	Department of Examination & Evaluation /Confidentiol		
4	Department of Finance		
4	Department of Admission		
5	Department of Academics		
6	Department of IT and Communication		
7	Store Department		
8	CIQA		
9	Department of SLM Printing and Distribution		
10	Department of SLM & Publication		
11	Grievance Cell		
12	Department of Engineering & Campus Development		
13	Department of Establishment		
14	Department of Administration		
15	Department of Training & Research		

कुलसचिव
म.प्र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड)
भोपाल

बिन्दु क्रमांक–(13) विश्वविद्यालय कुछ शोध छात्रों का किन्ही कारणों से कोसवर्क नहीं हुआ है, सत्र 2014–15 में विश्वविद्यालय द्वारा कोर्स वर्क करवाया गया था, परन्तु वर्तमान में शोध कार्यक्रम संचालित नहीं होने के इकारण कोर्स वर्क नहीं कराया जा रहा हे। कई बार छात्रों द्वारा पांच बिन्दुओं के प्रमाण पत्र के लिये आवेदन दिये जाते रहे हैं परन्तु कोर्स वर्क नहीं होने के कारण प्रमाण पत्र दिया जाना संभव नहीं होता। अतः प्रकरण में निर्णय लेने के लिये अकादमिक काउंसिल के समक्ष विचारर्थ प्रस्तुत।

निर्णय– इस संबंध में विश्वविद्यालय अनुदान आयोग (UGC) से मार्गदर्शन प्राप्त किया जावे।

कुलसचिव

कुलसचिव
म.प्र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड़)
भोपाल

संस्था के संकाय सदस्यों व वरिष्ठ प्रशासनिक अधिकारियों हेतु –
ट्रांसमेडिटेशन प्रशिक्षण

संलग्न पत्र कं. Ref NO./ CPR/2022/05 दिनाँक 27/05/2022 महार्षि विद्या मंदिर से ई–मेल द्वारा प्राप्त हुआ है। जिसमें संस्था के संकाय सदस्यों व अन्य कर्मियों हेतु पाँच दिवसीय (1घंटा 30 मिनट प्रतिदिन) ट्रांसमेडिटेशन शिविर आयोजित करना प्रस्तावित है। उपरोक्त हेतु 1000 रू. प्रति व्यक्ति कें हिसाब से दक्षिणा / शुल्क का भी उल्लेख है।

वर्तमान समय में जब प्रत्येक व्यक्ति आर्थिक सामाजिक सांस्कृतिक व अन्य कारणों से मानसिक तनाव की स्थिति से गुजर रहा है ऐसे समय में उपरोक्त प्रशिक्षण कार्यक्रम विश्वविद्यालय कर्मचारियों की उत्पादकता बढाने में अपना महत्वपूर्ण योगदान दे सकते है।

सैद्वांतिक रूप से सहमत होने की दशा में सकारात्मक पत्र महार्षि विद्या मंदिर को प्रेषित किया जा सकता है। तथा दक्षिणा /शुल्क विश्वविद्यालय द्वारा शुरूआत में 15 कर्मियों के लिये कुल 15000/– रू. व्यय करना प्रस्तावित है।

डॉ0 संदीप कुलश्रेष्ठ
निदेशक सीका / अकादमिक

कुलसचिव

कुलसचिव
म.प्र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोहेफ़िज़ रोड)
भोपाल

Review Article

Microbiology Section

Vaccine Development Against *Salmonella* Typhi: A Search is Still On

SHAILENDRA SINGH, CHANDRA BHAN PRATAP, GOPAL NATH

ABSTRACT

Salmonella serovar typhi still remains a serious problem in South Asia, South-East Asia, and sub-Saharan Africa. The emergence of multidrug resistance, lack of proper diagnosis and chronic typhoid carrier are the main causes of such a high level of morbidity and mortality. Presently, three vaccines have been licensed for typhoid infection but none of them is optimum for complete eradication for want of safety and long lasting immunity. Several subunit and attenuated candidate vaccines are under trial. Recently, in India Typbar TCV conjugate vaccine has been licensed. However, this vaccine being subunit may not induce appropriate immune response and also it cannot be given to infants. We need a multivalent attenuated vaccine which can induce both cellular as well as humoral immunity against different pathogenic serovar of *Salmonella*. Live attenuated vaccine could be an attractive choice taking care of all the above points. In this review, we focus on the pathogenesis of *Salmonella* serovar typhi, role of humoral as well as Cell-Mediated Immune (CMI) response, different licensed vaccines with their pros and cons, and also the targets which are already been put on clinical trials. We have discussed the attenuation of the candidates by modification of certain structural and functional genes especially looking for induction of CMI.

Keywords: Candidate vaccine, Cell mediated immune response, Live attenuated

INTRODUCTION

Enteric fever is an acute generalised infection caused by human restricted *Salmonella enterica* subspecies *enterica* serovar Typhi, Paratyphi A and B. Majority (90%) of enteric fever cases are caused by Typhi serotypes. Enteric fever is a very important public health problem in countries with poor sanitation and inadequate hygiene. The recent global burden of typhoid fever is estimated to be ranging between 11 and 21 million. This burden is associated with 129000 to 161000 deaths annually [1]. The most affected age group for enteric fever is less than 14 years [2]. The most disturbing issue is that about 27% of the infections occur in the age group <4 years of which 10% are in infants <1 year of age. Typhoid is a major threat for the Indian subcontinent due to its high prevalence, severity, development of Multidrug Resistant (MDR) and persistence of carrier state in our population. Approximately, 2-5% of cases as well as subclinical infections develop carrier state irrespective of preexisting gall bladder disease [3]. The carrier state has been implicated in biliary tract cancer [4]. Chronic carriers are the reservoir of infection and are responsible for endemicity of the fever. Following ingestion, the organisms apart from resisting the low pH of the stomach, they get signals for induce multiplication before reaching the ileum [5]. In the small intestine, the bacteria multiply in the submucosa and Peyer's patches [6]. During systemic infection, bacteria reach the phagocytes of spleen, liver and bone marrow. Later, the infection manifests as bacteraemia. Death due to typhoid fever occurs usually due to perforation of the intestine or haemorrhage.

Chloramphenicol was introduced in 1948 and their resistance started to develop within two years of introduction of the drug and until 1972 chloramphenicol resistant *S. typhi* became a major problem [7]. Outbreaks of chloramphenicol resistant *Salmonella* occurred in Mexico, India, Vietnam, Thailand, Korea and Peru. The case fatality rate without antibiotic therapy was 10-20%. However, with antibiotics, it has come down to 1-4%. This mortality rate is usually due to delay in start of therapy. After the suggestion of Threlfall EJ et al., that *S. typhi* with decreased sensitivity to ciprofloxacin is endemic in several Asian countries [8], there has been several reports indicating that quinolones have almost lost their ground as a magic drug [9]. A gradual increase in mean Minimum Inhibitory Concentration (MIC) of ceftriaxone has already been reported by our group recently [9]. Emergence of resistance against the two second line drugs; ciprofloxacin and ceftriaxone has become a serious problem in the recent time. Recently, azithromycin is also showing the resistance as 20% of the recent isolates of *S. typhi* was showed unresponsive [10]. Then what can be done? Bacteriophage therapy (still under preliminary phase of development) or newer antibiotic molecules (which takes long time to reach clinical application) may be an alternative to the existing antibiotics. Immunotherapy is not practicable at the community level. So logically, a perfect or near perfect vaccine may be able to eradicate this human restricted bacteria globally.

It is important to understand the host immune response against the bacteria before addressing the issue of vaccine development. The subclinical, clinical and chronic carrier states basically depend on the balance between the virulence of the invader and the immune response of the host. The immunity against the bacterium is divided in two parts.

Innate Immunity against *Salmonella*

Components of innate immune system viz., complement and opsonising serum antibodies facilitate the uptake of the bacteria by phagocytes (macrophage, neutrophils and dendritic cells) [11] and epithelial cells and help to identifying specific Pathogen-Associated Molecular Patterns (PAMPs) of the pathogen. In Salmonellosis, TLR 4, TLR5 and TLR9 signaling systems are activated by bacterial DNA, flagella and Lipopolysaccharide (LPS). *Salmonella enterica* species is adapted to mammals including humans and has a complex cross talk system resulting ultimately in induction of host immune response. The bacteria are seeded into different organs of the body viz., liver, gallbladder, spleen, bone marrow etc., during sustained bacteraemia. A cycle of infection continues and bacteria either reinvade epithelial cells of the intestinal wall or shed in the faeces. However, after a certain period, the symptoms of Salmonellosis resolve. A small population of hosts may become chronic carriers [3,12]. Proinflammatory cytokine (IL-1β, IL-6, IFN-γ and TNF-α) are recruted to promote systemic inflammation [13,14]. IFN-γ is a

mutated randomly yielding highly attenuated strain of *Salmonella* typhi. The *galE* gene encodes UDP galactose-4-epimerase and *Vi* gene encodes surface polysaccharide. Once this gene is mutated, the mutant produces rough LPS in place of smooth LPS. When galactose is exogenously supplied the mutant was able to make smooth LPS till it was the available. This smooth LPS can protect the bacterium from phagocytosis. This vaccine gives protection via induction of anti-O and anti-H antibody (mucosal and serum) and also up to some extent of cellular immunity. Cellular immunity is induced in the form of T-cell activation and cytokine secretion. Currently this vaccine has been licensed in 56 countries of Africa, USA, Europe and Asia [37]. However, the immunity induced by this vaccine diminishes with increasing duration after vaccination. The protection rate differs from region to region viz., in Egypt it has given 96% protection for three years whereas in Chile, only 67% protection for three years. Later the protection rate decreased to 62 % for 7 years. The protection rate also varies in different age groups i.e. 59% in 5-9 years, 67% in 10-14 years and 85% in more than 15 years of age. Interestingly this chemically mutated vaccine also gives cross-protection against paratyphoid fever (Paratyphi B) causing serotypes but their protection level was only 42-56 %. This vaccine is also able to develop herd immunity in endemic settings.

Typbar-TCV (Typhoid Conjugate Vaccine)

It is developed by conjugation of tetanus toxoid protein with purified Vi polysaccharide (Vi-TT). It was licensed for the first time in India in 2013. It is given to children more than 6 months of age. Typbar TCV induces a high titre of anti-Vi antibody as well as higher avidity in comparison to Vi–unconjugated vaccine. Protection persisted in 84% infants (6-23-month-old) for 5 years. The efficacy in human volunteers after one month has been reported to be 87.1% and sero-efficacy 85% [38]. [Table/Fig-1] shows the status of current typhoid vaccines [26,27,39-44].

Newer Vaccine Development

What should be the criteria for ideal *Salmonella* vaccine?

For an ideal vaccine against enteric fever the recommended criterion are:

1. Vaccine strain should not be resistant to any antibiotics.
2. It should be highly protective against intestinal as well as systemic infection of *Salmonella* typhi and should also protect against other serotypes of *Salmonella*.
3. It should be attenuated to protect humans.
4. Live attenuated vaccine should not cause any harm or inhibit the growth of the vaccine.
5. Vaccine strain should not interfere with *Salmonella* detection methods.
6. Vaccine should have a marker to differentiate it from wild type of strains.
7. It should easily be administered.
8. Live attenuated vaccine should inhibit the colonisation of other *Salmonella* serovars in the intestine.

Vaccine characteristics	Ty21a vaccine	Vi polysaccharide vaccine (ViPS)	Typhoid conjugate vaccine (TCV)
Type	Live, attenuated (Chemically induced mutagenesis affecting several genes)	Subunit (Purified Vi polysaccharide from Ty2 *S. typhi* strain)	Conjugated subunit vaccine (purified Vi polysaccharide conjugate with tetanus toxoid, recombinant Exo Protein A and recombinant Diphtheria Toxin) [42,44]
WHO recommended	(2008) endemic and epidemic settings	(2008) endemic and epidemic settings	(2018) High typhoid burden or high antimicrobial resistance
Storage and preservative	2-8° C to for 3 years	2-8° C for 3 years Phenol (1.250 mg) per dose	2-8° C 2-Phenoxyethanol (5 mg)
Type of immune induction	It induces serum and mucosal immunity against both O (somatic) and H (flagellar) antigens	Single dose induces higher anti-Vi antibody titre in serum	Single dose elicited higher anti-Vi antibody titre in serum
Licensed	1983 in Europe, 1989 in USA	1994 in USA	2013 in India
Age of vaccination	Enteric coated capsules >6 years as per manufacturer	≥2 years	≥6 months
Schedule	Enteric coated capsules 3-4 doses on alternate days	Single dose	Single dose
Administration	Oral	0.5ml injection (Intramuscularly or subcutaneously	0.5 ml injection (Intramuscularly)
Efficacy	33-77% [26]	55-72% [26]	85-87.1% [42,44]
Duration of protection	5-7 years	3-5 years	Up to 5 years
Cross protection against NTS	Partial protection against Paratyphi B (49%) [40]	No evidence of cross protection	Not studied
Co-administration	It is given with Live vaccine of polio, cholera, yellow fever and MMR	- It is given as routine vaccine in children - Hepatitis A and yellow fever in travels	Vaccine of Mumps, Rubella and Measles show no interference with TCV [44]
Herd immunity	Herd immunity develops	Not applicable	Not applicable
Persistence of immunity	Protection from 7th day to 7-years	Protection from 7th day to 3-years	Not clear
Immunity in immuno-compromised	Not recommended specially CMI deficient	Safe	No data available
Immunity in pregnancy	No data from pregnant women regarding their immunization		
Disadvantage	Not licensed for infants, Require 3-4 doses, Lack of anti Vi antibody	Not licensed for infants, lacks memory response, lacks affinity maturation, Only protects against *S. typhi*, revaccination after every 3 year	Protection only against *S. typhi*
Adverse effects	Transient fever and gastrointestinal problems	No serious adverse effects known	Fever, pain, swelling reported in 10% of cases
References	Fraser A. et al., 2007 [26], Poolman J. et al., 2011 [39]	Khan MI. et al 2010 [27], Kantele A. et al 2012 [40], Sur D. et al., 2009 [41]	Mai NL. et al., 2003 [42], Thiem VD. et al 2011 [43], Szu SC. et al., 2013 [44]

[Table/Fig-1]: [illegible]

and their mutants in *Salmonella* typhimurium is highly attenuated and induce immune response in mice but hypersensitive to the microbicidal defensins [61,62].The live attenuated vaccine of *S. typhi* is developed for oral administration by mutating global regulator phoP-phoQ gene. This vaccine is based on parent Ty2 strain and developed by Avant Immunotherapeutics. This candidate vaccine has good immunogenicity to induce mucosal and systemic antibodies. The phoP/Q mutants are avirulent inside macrophages. The phoP mutant or constitutive expression of phoP gene was attenuated in mice because it is able to establish infection in Peyer's patches but unable to infect or reaching spleen. Thus, these mutants are highly suitable for induction of CMI measured by DTH and may be used as an oral candidate vaccine [60-62]. The phoP/Q mutant of *Salmonella* typhi is safe and immunogenic in humans [63].

clpPX

In *Salmonella* flhD/flhC is a transcriptional regulator of flagellar gene synthesis. This regulator is degraded by *clpPX* gene which encodes a protein digesting enzyme. If the *clpPX* gene is mutated, flagellar gene synthesis is enhanced as the inhibitory action of *clpPX* is lost. However, *clpPX* mutated CVD strain of *Salmonella* is under vaccine trial and outcome is awaited [64].

htrA mutant

The *htrA* gene encodes heat stress protein of *E.coli*, and their mutants are avirulent in mice model. *HtrA* is a serine protease which can cleave misfolded protein in response to heat shock. This protease is induced in heat shock condition and mostly digests periplasmic proteins which are misfolded during the heat stress. The *htrA* mutant is not heat sensitive but their susceptibility to oxidative stress is increased in macrophages as compared to wild type strain. It protects the mice from re-infection [65].These gene mutant are safe in normal mice as well as immune-compromised mice such as x-ray irradiated, anti TNFα treated (XID) etc., but it showed some virulence in T-cell deficient mice [66].

ssaV

It is a part of type III secretion system (T3SS) which are encoded by SPI-2. It is required by both the serovars of Typhi and Typhimurium for virulence in human and mice models [67]. SPI-2 encoded genes playing major role in survival of the bacteria inside macrophages of the host [68]. The SsaV protein makes a part of injectosome (T3SS) which secretes various effector proteins outside as well as inside of cell membrane of the host. The ssaV gene mutants are thus made not to secrete effectors protein inside the host cells to cause the disease.

Aromatic Amino Acid Biosynthetic Pathway

Aromatic amino acid biosynthetic genes are needed for bacterial growth. In general three genes are involved in aromatic amino acid biosynthesis viz., *aroA*, *aroC* and *aroD*. Aromatic amino acid biosynthesis gene mutant is a type of auxotrophic mutant which needs a specific metabolite for their growth. Human host is deficient in such metabolites. Therefore, the strain containing these mutations is attenuated in the absence of metabolite and cannot grow in vivo. The bacteria are easily killed but can induce an immune response. If one or more genes were mutated in this operon, it causes irreversible loss of virulence and it also transform from prototroph to auxotroph for Dihydrobenzoate (DHB) and Para-aminobenzoic acid (PABA) [69]. These mutant strains were able to induce an immune response and also protect from the lethal dose of bacterial challenge [70]. These mutants were able to induce both types of immunity viz., cellular as well as humoral immunity [69]. More than one mutation in aro operon (Aromatic amino acid biosynthesis) ensures lack of virulence reversion in bacteria but it does not affect immune inducing potential. A double mutant of *aroC* and *aroD* were also used in human volunteers and they showed good immune response but reported causing bacteraemia in some cases [71].

cya (Adenylate cyclase) and crp (cyclic AMP receptor protein)

The *cya* gene encodes adenylate cyclase enzyme which synthesises cAMP from ATP for various cellular activities. Mostly cAMP is needed for transport of various carbohydrates and amino acids. It also plays a role in the synthesis of flagella, fimbriae and outer membrane protein of bacteria [71]. Oral or intraperitoneal vaccination of single mutant *cya* or *crp* gene or double mutant of *cya* and *crp* were highly attenuated. Oral vaccine provides protection from oral challenge with wild type strains. When given orally, mutant bacteria invade the Peyer's patches and mesenteric lymph nodes but unable to invade and survive in spleen in mouse models [72]. In humans, it has been reported that it induces immune response but also gives some side-effects such as fever and bacteraemia.

DNA Vaccines

Injection of naked DNA induces both humoral immunity and CMI. In fact bacterial DNA encodes such a gene which after expression induces Th1 and Th2 responses. For DNA vaccine against typhoid, five peptides were screened that showed high expression in vivo. Those genes are *mig14*, *licA*, *sseB*, *ssaJ*, or *sifB*. Of these five, *sseB* and *mig14* have been observed to be exceptionally efficacious antigens providing specific immunity and protection as compared to other antigens used. Other than high expression level, there are certain antigenic parameters which can influence protective efficacy and show the different immune response for different antigen [73]. For intracellular pathogens, expression of a selected antigen during infection may be more important for the candidate vaccines [Table/Fig-2]. Other vaccine candidate against iNTS (Non Typhoidal *Salmonella*) and *Salmonella* Paratyphi A are explained in [Table/Fig-2] [51,52,73-75].

	Name	Summary	Stage of development	Developer	References
1.	**Vaccine against *Salmonella* Paratyphi A**				
a.	O 2-TT	O 2 Conjugate	Phase 2 and under clinical trial	-Technology transfer from NIH to Chengdu Institute (China) -Changchun Institute of Biological Products	Konadu E et al., 1996 [51]
b.	O 2-CRM197	O:2 Conjugate	Preclinical	NVGH (Novartis Vaccine Institute for Global Health)	Micoli F et al., 2012 [52]
2.	**Vaccine against iNTS**				
a.	O 4,5/O:9-CRM	O:4,5/O 9 Conjugate	Preclinical	NVGH (Novartis Vaccine Institute for Global Health)	Micoli F et al., 2012 [52]
b.	WT05	Live attenuated	Phase 1	Microscience Wokingham Berkshire	Hindle Z. et al., 2002 [74]
c.	*Salmonella htrA* mutant	mutant Live attenuated	Preclinical	Indian Institute of Science Bangalore	Allam US. et al., 2011 [75]
d.	DNA vaccine	*AroQ, licA, Mig-14, SsaJ, SsaV, SseB, SifA, SifB, Stm4065,* and *VirK*	Mice Study	Max Planck Institute for Infection Biology, Germany	Rollenhagen C, et al., 2004 [73]

[Table/Fig-2]: [illegible]

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PARTICULARS OF CONTRIBUTORS:
1. PhD Scholar, Department of Microbiology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India.
2. Postdoctoral Fellow, Department of Microbiology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India.
3. Professor, Department of Microbiology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Gopal Nath,
Department of Microbiology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India.
E-mail: gopalnath@gmail.com

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कुलसचिव
म.प्र. भोज (मुक्त) विश्वविद्यालय
राजाभोज मार्ग (कोलार रोड)
भोपाल