

# An Examination of the Employment Preparedness, Job Satisfaction, and Impact in the Workplace of Qatar University Pharmacy Alumni: A Mixed Methods Study

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## Background

- Job satisfaction affects employment productivity and behavior which impact the delivered care
- Job preparedness is positively linked to job performance, promotion and career development
- Impact in the workplace: any achievement/ accomplishment by alumni
- In Qatar, no study that explored the pharmacy graduate's employment experience; job satisfaction, preparedness, impact in the workplace

## Objectives

This research aims to:

1. investigate the level of job satisfaction among QU-CPH alumni
2. explore the perspective on preparedness to practice of QU-CPH alumni
3. examine QU-CPH graduates' impact in the workplace

## Methods

### Design

#### Sequential exploratory mixed methods design

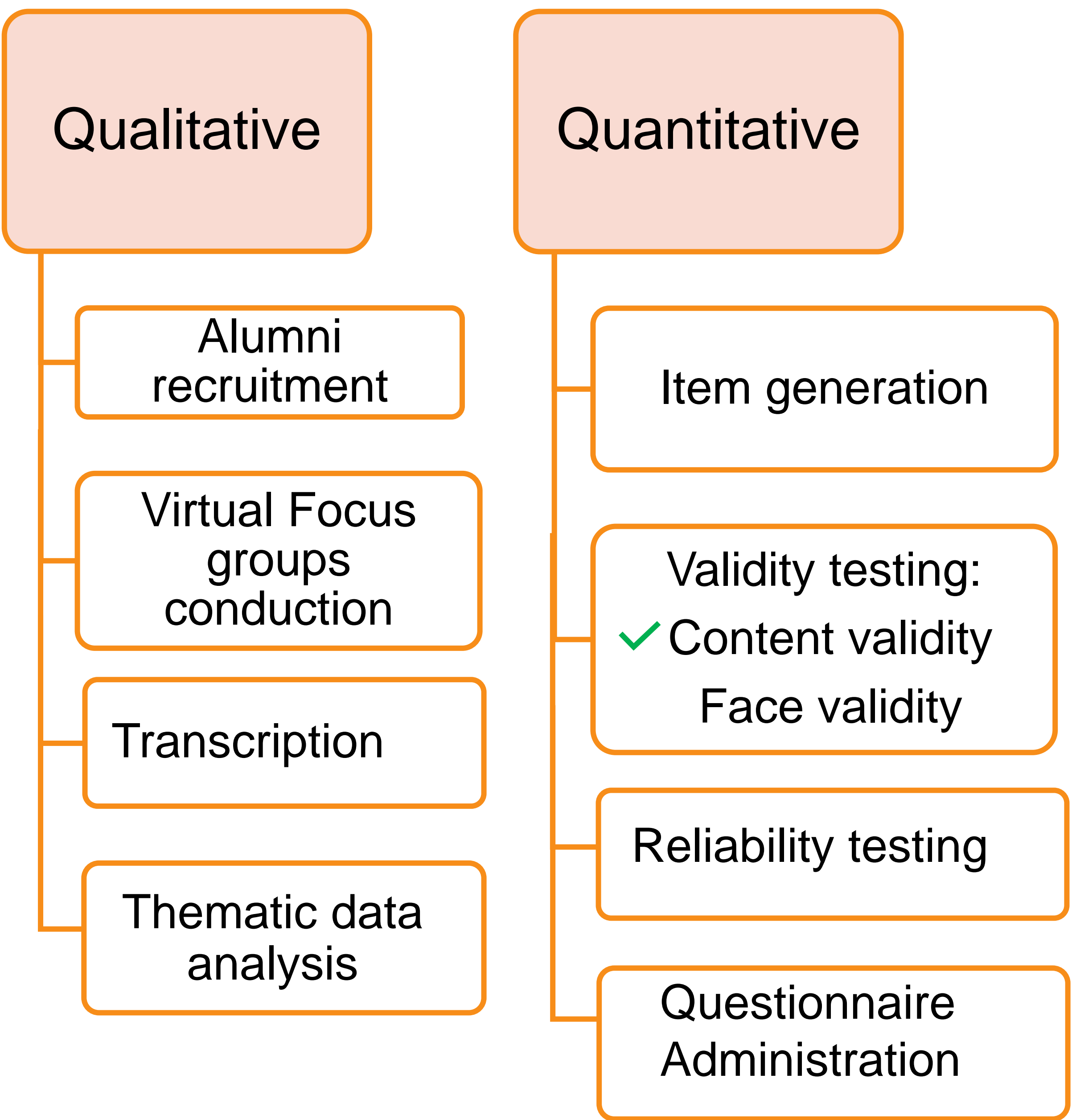


Figure 1: Design of methods

## Results

Thematic analysis using NVivo® identified 6 themes which further divided into subthemes (as shown in **Figure 2** below)



Figure 2: Themes, sub-themes, alumni's quotes

## Conclusion

- Majority of alumni were prepared for practice in term of knowledge and skills.
- Positive impact in the workplace; distinguished fingerprint, implementation of National Association of Pharmacy Regulatory Authorities (NAPRA) competencies and AFPC learning outcomes.
- The findings provide new insights into the obstacles and opportunities faced by alumni.
- Barriers will be addressed and used to refine the curriculum in the future.

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# Investigation Of Students’ Interpretation Of Antimicrobial Stewardship (AMS): A Think Aloud Study With Verbal Protocol Analysis

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## Background

- Antimicrobial Resistance continues to be a global concern, due to inappropriate or excessive use of antimicrobial products <sup>(1)</sup>
- Clinical reasoning and problem solving are key skills that pharmacists must demonstrate to accomplish the goals of antimicrobial stewardship (AMS) programs <sup>(1)</sup>
- Additional AMS training for undergraduate students is needed <sup>(2)</sup>
- Little is known about the clinical reasoning of pharmacy students when faced with clinical AMS scenarios

## Study Objective

Investigate how pharmacy students apply clinical reasoning skills to AMS scenarios

## Methods

### Study Design

- A concurrent think aloud methodology and a verbal protocol analysis were used
- Qualitative study (case-study approach)
- The study was conducted at the College of Pharmacy at Qatar University

### Participants

- A total of 20 students were randomly chosen
- QU-IRB ethical approval (QU-IRB 1334-E/20)

### Research Procedure

- Step 1: Development of AMS cases**
- Done by infectious disease (ID) trained faculty member, then reviewed by another ID specialist
- Step 2: Data collection**
- Interviews were conducted online
- Written and informed consents were collected
- Step 3: Data analysis**
- Verbatim data transcription
- Coding was done using inductive thematic analysis as illustrated by figure 1

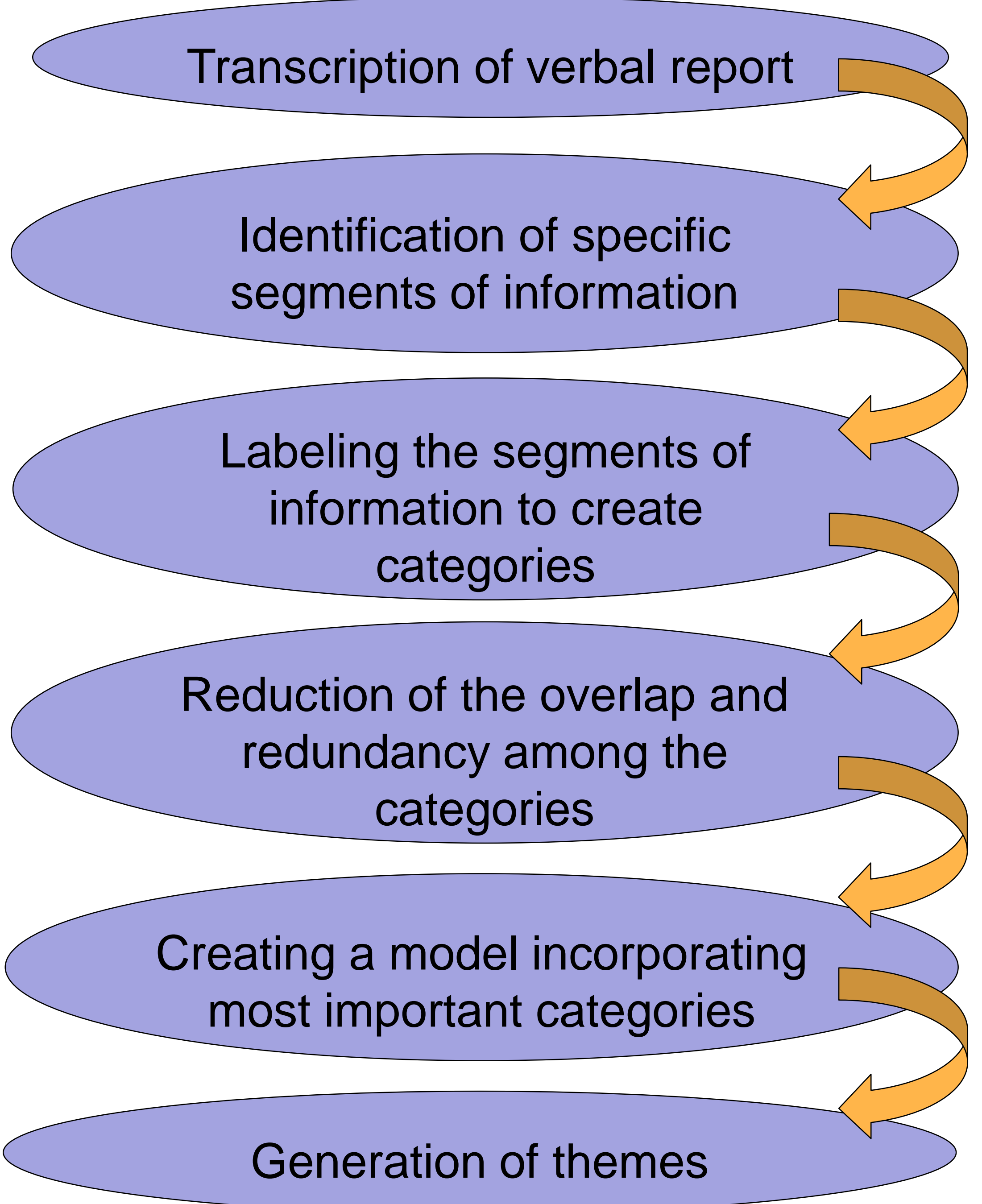


Figure (1): Inductive Thematic Analysis Process

## Results

- The results are illustrated as themes and sub-themes in figure 2:
- 1. Theme 1: Students’ focus during AMS case solving and the role of pharmacy
- 2. Theme 2: Students’ reasoning processes

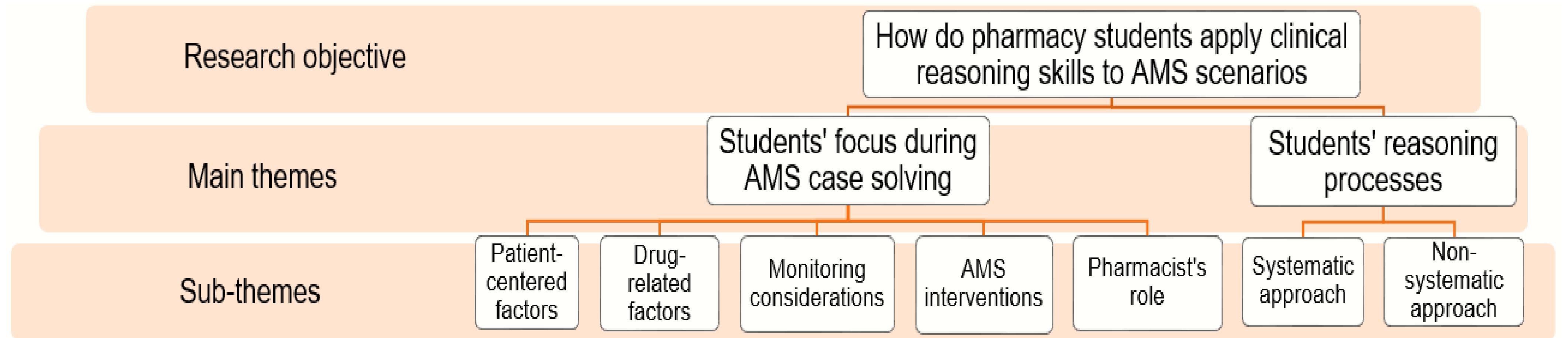


Figure (2): The Main Themes and Sub-themes Generated in Relation to the Study’s Research Question

### Theme I: Students’ Focus During AMS Case Solving

- This theme encompassed several sub-themes:
- 1. Patient-centered factors
- 2. Drug-related factors
- 3. AMS interventions
- 4. Monitoring
- 5. Pharmacist’s role

Table 1: Illustrative Examples of the AMS Intervention Category

Students’ segments	Code
“We can also have prospective auditing where we go back to the prescriber and see why they are prescribing such medications”	<b>Prospective Audit &amp; Feedback</b>
“I would go with preauthorization and I would go also to restrict medications-antibiotics to specific patient characteristics or to specific consultant”	<b>Formulary Restriction &amp; Preauthorization</b>
“The organism is E.coli, first of all meropenem is broad spectrum antibiotic so we need to de-escalate to something more like not broad spectrum, so we need something to treat gram negative”	<b>De-Escalation</b>

### Theme II: Students’ Reasoning Processes

- This theme encompassed two thinking approaches:
- 1. Systematic approach
- 2. Non- Systematic approach

Table 2: Illustrative Examples of the Systematic Approach

Students’ segments	Code
“We have to see the three factors: the patient, drug and organism factor”	<b>3 Factor Approach</b>
“Patient has penicillin/sulfa allergy so for example trimethoprim/sulfamethoxazole is eliminated and piperacillin/tazobactam is eliminated”	<b>Elimination Approach</b>
“I will check the guidelines for MRSA, what is the appropriate antimicrobial in this case and to give the appropriate dose”	<b>Guidelines-Based Decisions</b>

Table 3: Illustrative Examples of the Non-Systematic Approach

Students' segments	Code
“I do not know what is the UTI therapy, I do not have an idea right now”	<b>Knowledge deficit</b>
“When do we consider stepping down to oral therapy? This one I do not recall at all”	<b>Lapses</b>
“So I will go with giving trimethoprim. Oh, no she is allergic to sulfa. So then I will go with trimethoprim. Oh god why do I keep going back to trimethoprim”	<b>Disturbed Thought Process</b>

## Conclusions

- Our findings demonstrate distinct patterns of clinical reasoning of pharmacy students when interpreting AMS-based clinical scenarios
- Findings can be used to inform curricular-based teaching interventions for skill development in AMS

## References

- World Health Organization. Antimicrobial resistance. 2020. <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance> (accessed 8 April 2021)
- Nasr ZG, Higazy A, Wilbur K. Exploring the gaps between education and pharmacy practice on antimicrobial stewardship: a qualitative study among pharmacists in Qatar. Adv Med Educ Pract. 2019;10:287-95.



# Assessment of The Association Between Air Pollutants and Autism Spectrum Disorder: A Systematic Review.

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## Background

- ❖ Autism spectrum disorder (ASD) is a group of neurodevelopmental disorders characterized by communication difficulties and repetitive patterns of movement.
- ❖ Genetic, paternal and environmental factors might contribute towards ASD pathogenesis
- ❖ Due to inconsistencies across studies, it is still difficult to conclude the association between ASD and air pollutants.
- ❖ No comprehensive systematic reviews that evaluate the relationship between exposure to all possible air pollutants and ASD incidence.

## Study Objectives

- ❖ To assess the influence of exposure to environmental pollutants on autism incidence.
- ❖ To determine which type of environmental pollutants has the greatest influence.

## Methods

### Search strategy

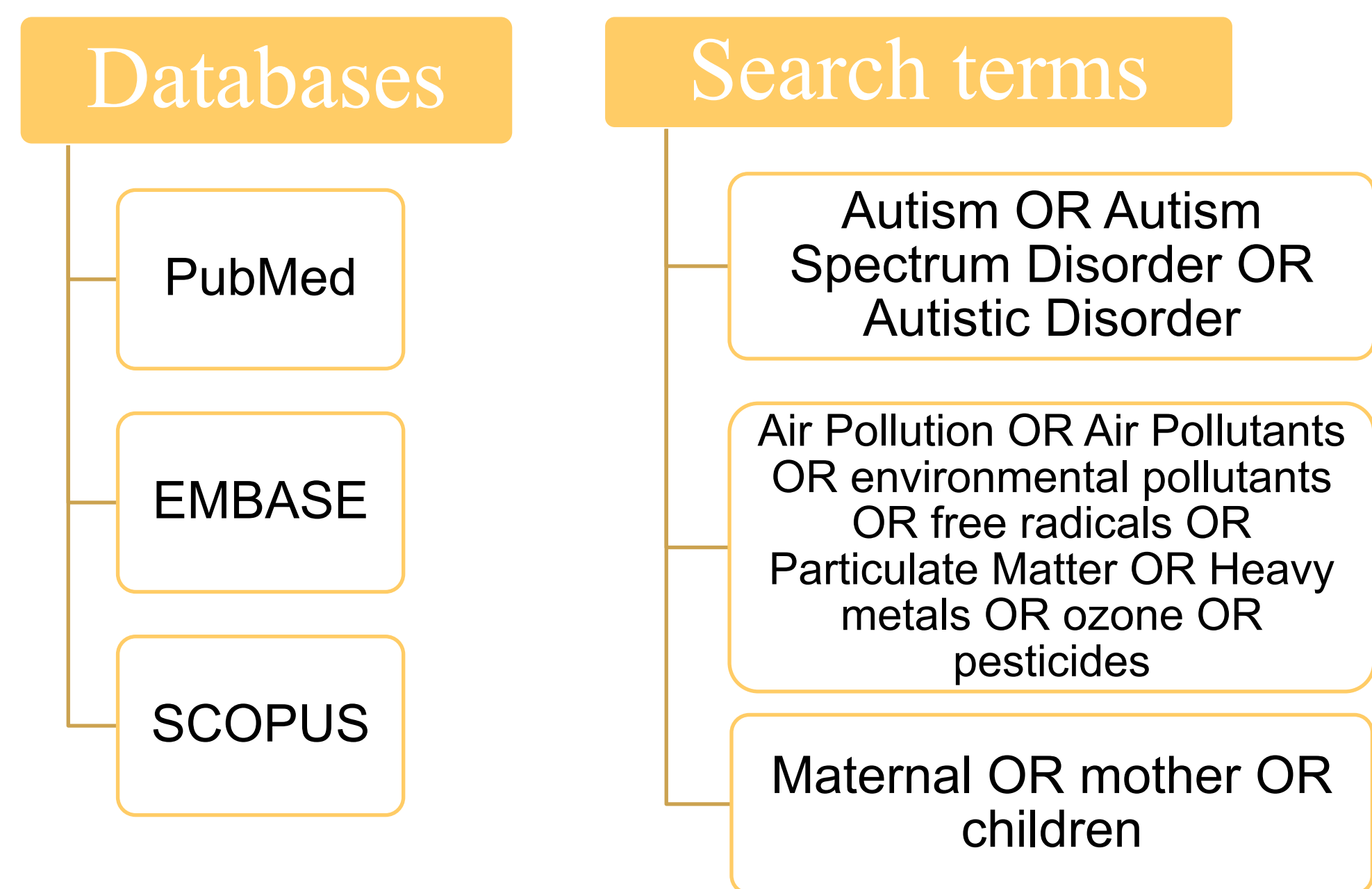


Figure 1. databases and search terms

### Inclusion criteria

- ❖ Type of study: Observational including case-control or cohort studies.
- ❖ Conduct exposure assessment to air pollutants
- ❖ Type of participants: children and/or mothers
- ❖ Clinically assessed ASD diagnosis
- ❖ English language papers

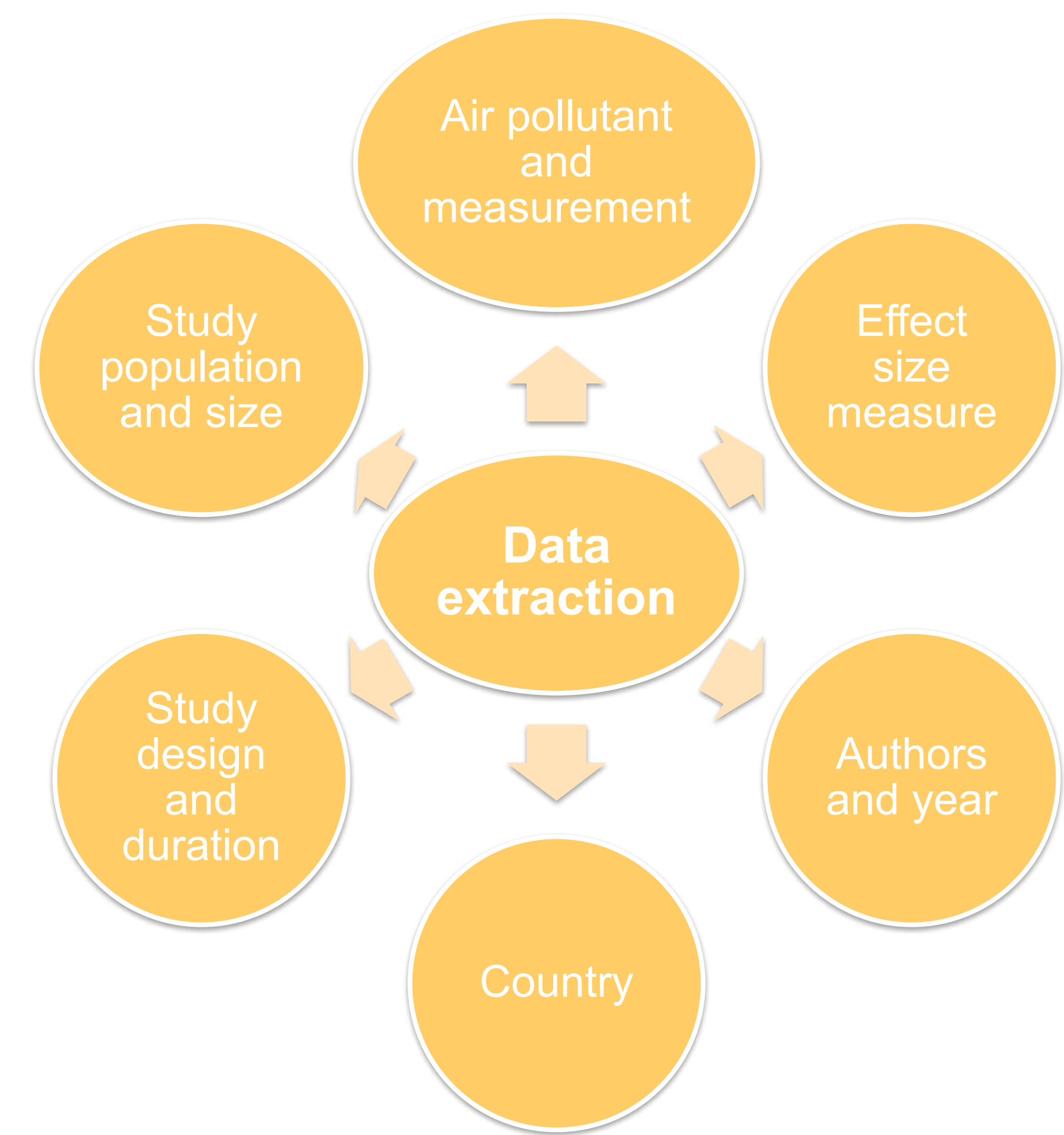


Figure 2. Data extraction form

### Quality assessment

- ❖ Newcastle-Ottawa Quality Assessment Scale (NOS); it has specific forms for case-control and cohort studies appraisal.
- ❖ It consists of seven items addressed in three categories.

## Results

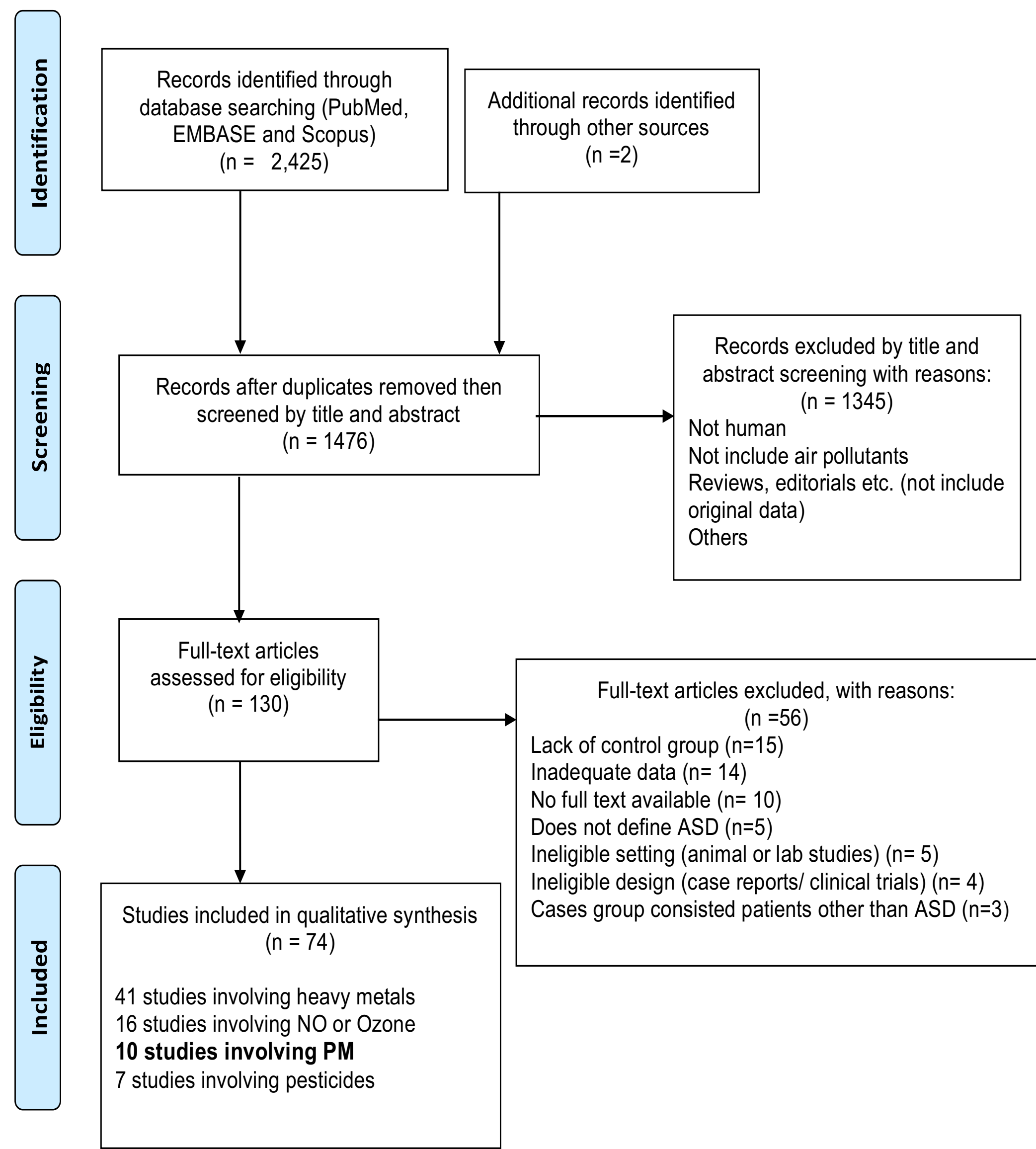


Figure 3. PRISMA Flowchart of paper selection process

## Studies Characteristics

### Country

- ❖ US (n= 5), China (n= 2), Sweden (n=1), Iran (n=1), and Canada (n=1).

### Study type

- ❖ 9 of the 10 extracted studies were case-control
- ❖ One is cohort.

### Study population

- ❖ Both maternal and children exposure evaluated (n=6)
- ❖ Only maternal exposure (n=2)
- ❖ Only children exposure (n=2)

**Type of air pollutants studied** (focused on particulate matter (PM) in this report)

- ❖ PM2.5 (n=7)
- ❖ PM10 (n=6)
- ❖ PM1 (n=1)

## NOS quality of included papers

Author/year	Selection (Max=4)	Comparability (Max=2)	Exposure (Max=3)	Overall quality score
Kaufman, J. et al. (2019)	3	2	2	7/9
Chen, G. et al. (2018)	4	2	2	8/9
Geng, R. et al. (2019)	4	2	2	8/9
Gong, T. et al. (2017)	3	2	2	7/9
Talbott, E. et al. (2015)	4	2	3	9/9
Volk, H. et al. (2013)	4	2	2	8/9
Yousefian, F. et al. (2018)	4	2	2	8/9
Kalkbrenner, A. et al. (2015)	3	2	2	7/9
Pagalan, L. et al. (2019)	4	2	1	7/9
Raz, R. et al. (2015)	3	2	2	7/9

## Key findings from extracted articles

### PM<sub>2.5</sub> association

- ❖ Of the 7 studies that assessed PM<sub>2.5</sub> exposure:
  - 5 showed significant association with ASD risk
  - Majority during late pregnancy and first years of life
  - 2 found no association; however, elevated odds ratios were reported.

### PM<sub>10</sub> association

- ❖ Of the 6 studies that evaluated PM<sub>10</sub> exposure
  - 3 found significant association
  - 3 found no association
  - most of the odds ratios are inferior

### PM<sub>1</sub> association

- One study that suggested a positive correlation with postnatal exposure during the 2<sup>nd</sup>, 3<sup>rd</sup> years of life

## Limitations

### Study limitations

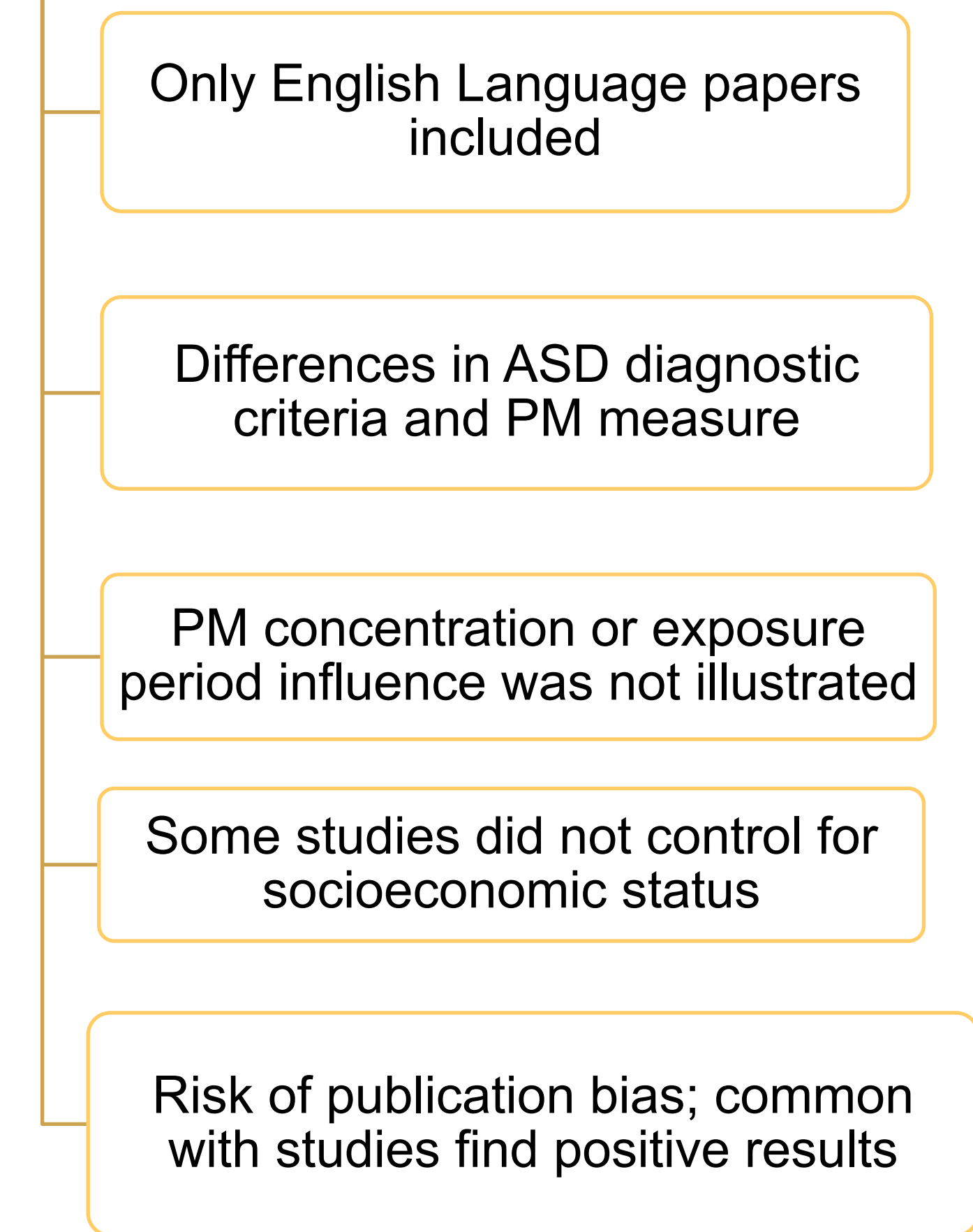


Figure 4. study limitations

## Conclusion

- ❖ The data available is still inadequate to confirm a clear consensus on whether PM exposure significantly increases the incidence of ASD.
- ❖ The association profoundly depends on PM size and source.
- ❖ The positive association between ASD and PM<sub>2.5</sub> is more clear compared to PM<sub>10</sub>.
- ❖ There is a need for:
  - Assessment of PM concentration and exposure period influence.
  - The use of standardized ASD diagnosis criteria

## References

- ❖ Roberts AL, Lyall K, Hart JE, Laden F, Just AC, Bobb JF, et al. Perinatal air pollutant exposures and autism spectrum disorder in the children of Nurses' Health Study II participants. Environ Health Perspect. 2013;121(8):978-84.
- ❖ Peterson J, Welch V, Losos M, Tugwell PJ. The Newcastle-Ottawa scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. Ottawa: Ottawa Hospital Research Institute. 2011.



# Types and Severity of Medication Errors Associated with the Use of Automated Systems within the Medication Use Process: A systematic Review

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## Background

- Medication use process is complex with multiple stages which increases the risk of medication errors- preventable event that may cause inappropriate medication use or harm
- Leads to detrimental clinical and financial consequences
- Automated systems implementation reduces errors up to 37%.
- The use of these systems still requires human intervention and has been associated with new types of errors.
- However, there is lack of published data on the type of errors and their severity.

## Objective

- To determine the types and severity of medication errors that are associated with the use of automated systems in the medication use process.

## Methods

### Design

- Systematic Review using PRISMA protocol
- Protocol has been registered on PROSPERO as CRD42020212900

### Databases

- PubMed, EMBASE, Cochrane Library

### Inclusion Criteria

- Observational studies including cross-sectional, case-control, nested case-control, cohort and case series,
- Experimental studies including quasi-experimental, randomized, non-randomized, controlled and uncontrolled
- English Language studies from 2000 to 2019
- Focused on types and severity of medication errors associated with automation
- Primary, acute, long-term, ambulatory and institutionalized care settings

### Exclusion Criteria

- Case reports, reviews, abstracts, personal opinions, commentaries, and conference reports

- Animal studies

### Quality Assessment

- Hoy et al. Tool

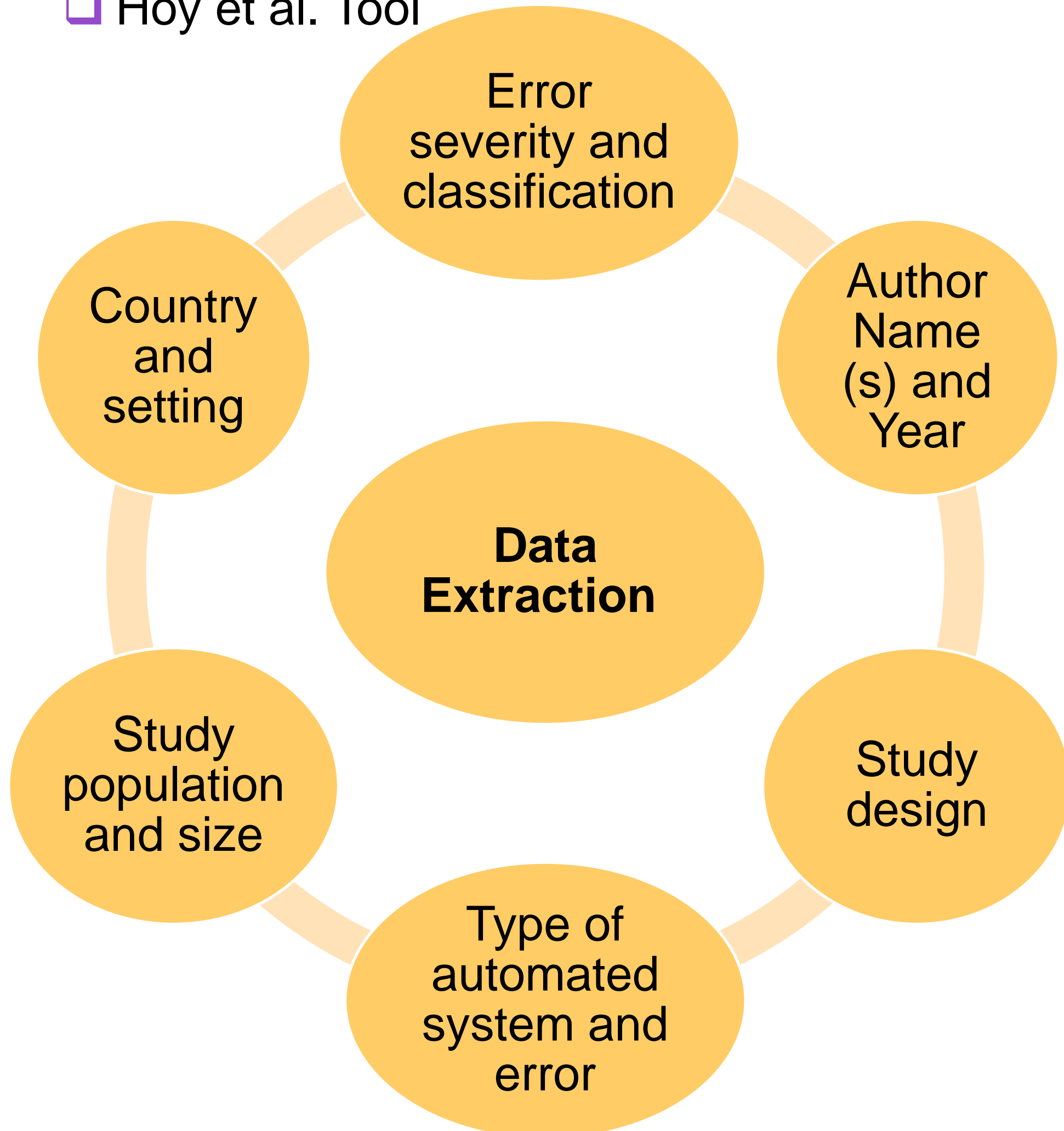


Figure 1. Data Extraction Tool

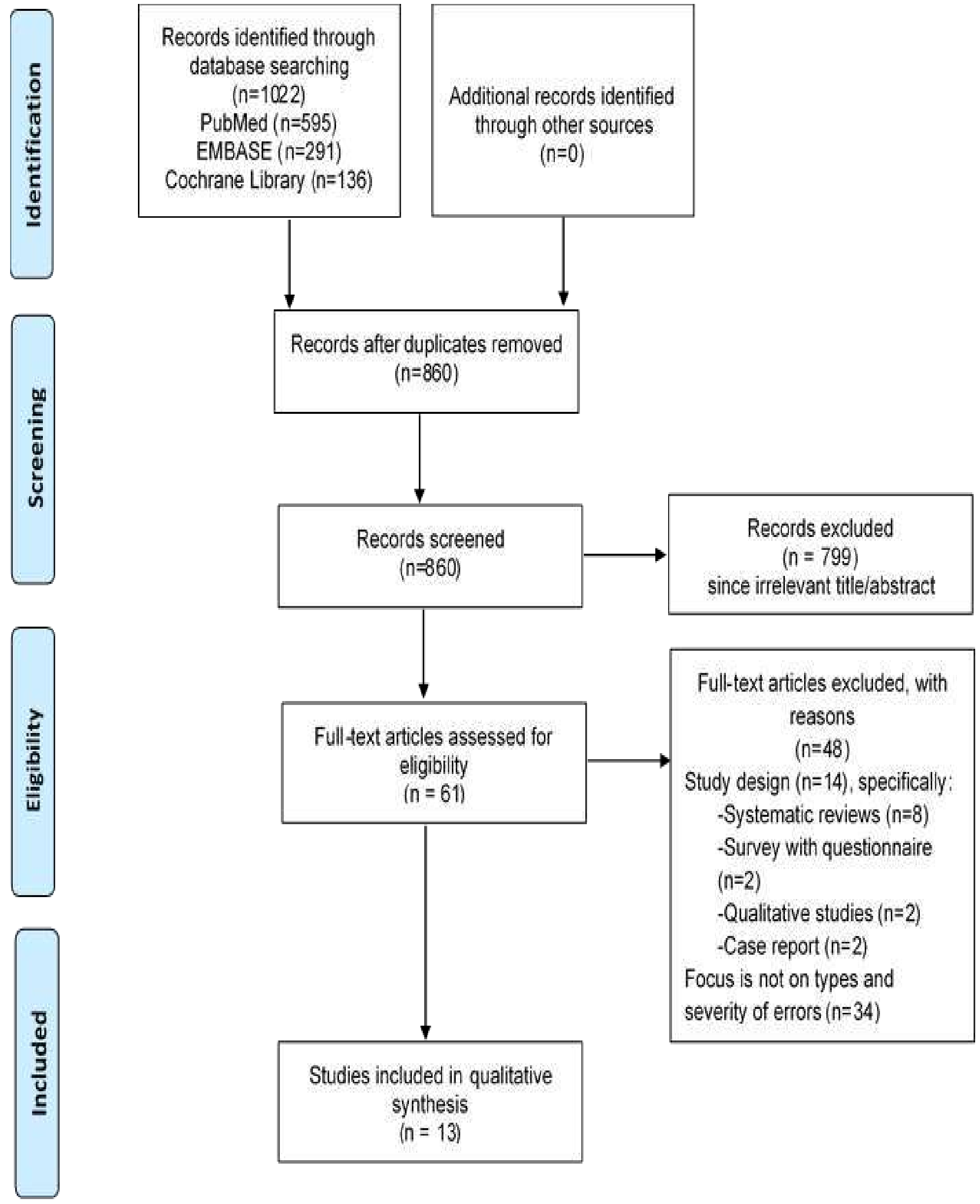


Figure 2. PRISMA Flow Diagram

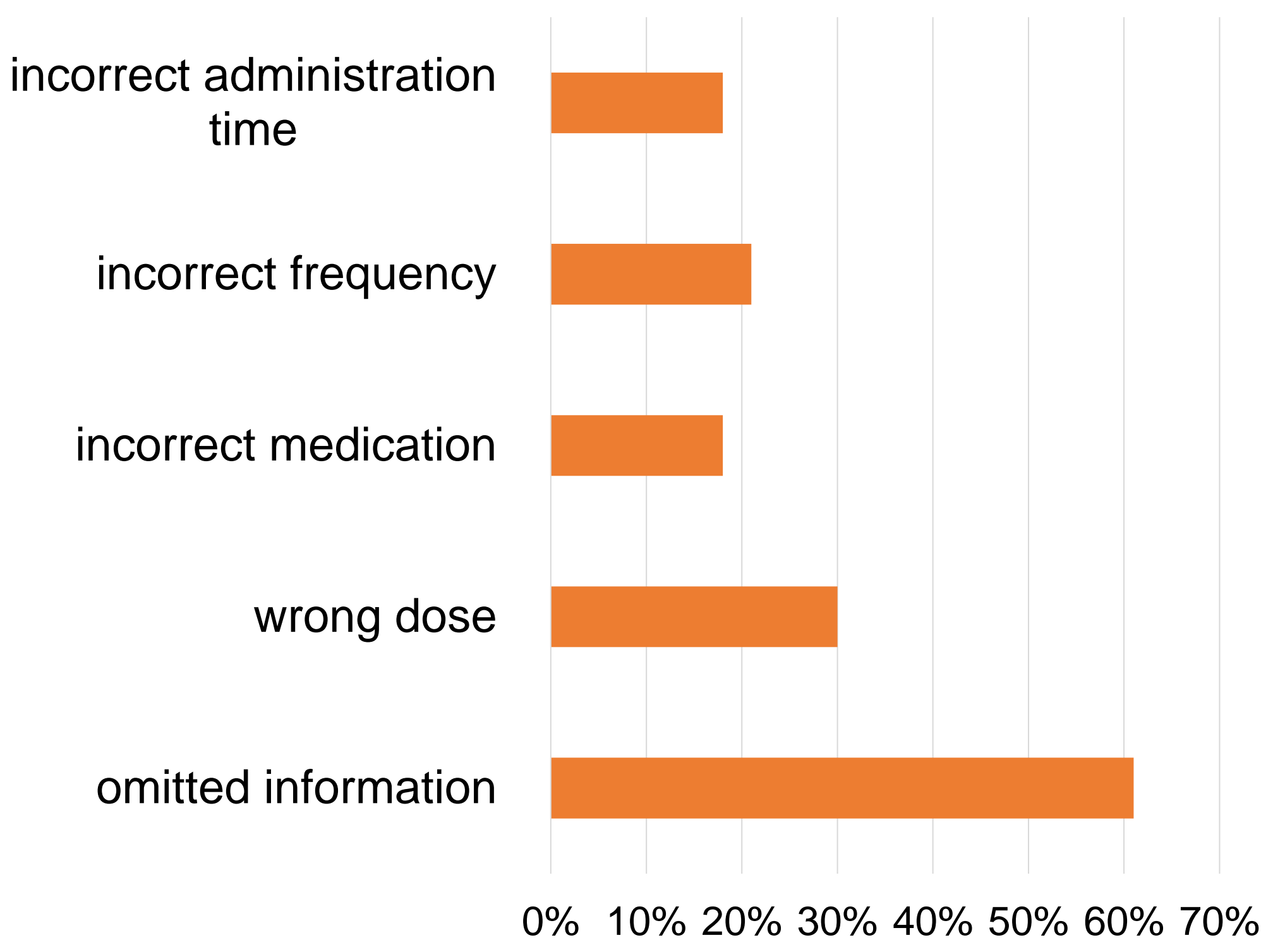


Figure 3. Frequency of Medication Errors Associated with Automation

Table 1. Quality Assessment of Included studies

Number of studies (n)	Overall Risk Score (0-3; 4-6; 7-9)	Overall Risk of Bias (low; moderate; high)
Eight	0-3	Low
Five	4-6	Moderate

## Results

### Screening and Inclusion

- Initially 1022 records, 860 after de-duplication
- 61 full text articles assessed for eligibility
- 13 full text articles were included (see figure 2)

### Country

- Spain (n=4), Unites States (n=3), France (n=2), Netherlands (n=2), Australia (n=1), Brazil (n=1)

### Study population and Size

- Sample size not specified (n= 5), study population not specified (n=11), population identified (n=2)

### Study type

- Prospective cohort (n=6, 46%), retrospective cohort (n=2, 15%), controlled lab study (n=1, 8%), experimental study (n=1, 8%), longitudinal observational quantitative study (n=1, 8%), descriptive and analytical (n=1, 8%)

### Study Setting

- Hospitals (n=11), tertiary care facility (n=1), nursing home (n=1)

### Automated System

- CPOE (n=9, 69%), ESP (n=1, 8%), BCMA (n=1, 8%), distribution robot (n=1, 8%), CPOE and ADC (n=1, 8%)

### Medication Use Stage

- Prescribing (n=8, 62%), administration (n=9, 69%), dispensing (n=2, 15%), not mentioned (n=1, 8%)

### Error Type

- Incorrect medication (n=5, 1-18%), incorrect administration time (n=4, 3-18%), omitted information (n=8, 4-61%), wrong dose (n=8, 4-30%), incorrect frequency (n=5, 0.6-21%) (see figure 3)

### Error Severity

- NCC MERP index (n=6, 46%), other scales (n=3, 23%), no severity assessment (n=4, 31%)

### Error Classification

- For studies that used NCC MERP index: category B (n=4), followed by A (n=2) or C (n=4)

### Quality Assessment

- low bias risk (62%), moderate bias risk (38%) (see table 1)

## Limitations

- Only English Language studies included
- Short study period
- Critical gaps in the sampling procedure of included studies- sample size calculation, low response rate
- Risk of response and sampling bias
- Internal and external validity uncertain

## Conclusions

- The findings suggest that the use of automation is associated with the occurrence of errors mostly in the prescribing and administration stage.
- Most frequently reported error type was omission error of dose, duration, or frequency because of complexity of automated systems and lack of adequate training
- May be reduced by using forcing functions
- Second most reported error was incorrect dose error that occurred during drug withdrawal or dosing calculation because of increased communication load and alert fatigue
- May be lowered by designing a more user-friendly interface during development
- No definite conclusion could be made about the severity and classification of errors
- Future Focus: on automation related errors in Asia and classifying the severity of errors using NCC MERP index
- Future study design: use of appropriate sample size and inclusion of patient characteristics



# The Optimization of the Critical Quality Attributes of an Immediate Release Dosage Form of Ibuprofen using D-optimal Design

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## Background

- Ibuprofen is poorly soluble in the acidic stomach which delays its clinical effect.
- Ibuprofen's absorption is limited by its dissolution rate requiring an increase in its active ingredient which increases the risk of adverse drug reactions.
- Design of Experiments (DoE) and Quality by Design (QbD) offer the advantages of: increased accuracy, resource saving, and the ability to test more than one factor at a time and finding interactions.



## Objectives

- To use DoE (D-optimal design) and QbD to develop a quantitative chemometric approach to explore and identify the critical formulation parameters, process the information to and generate essential knowledge for the design of a **safe and efficacious ibuprofen dosage form**.

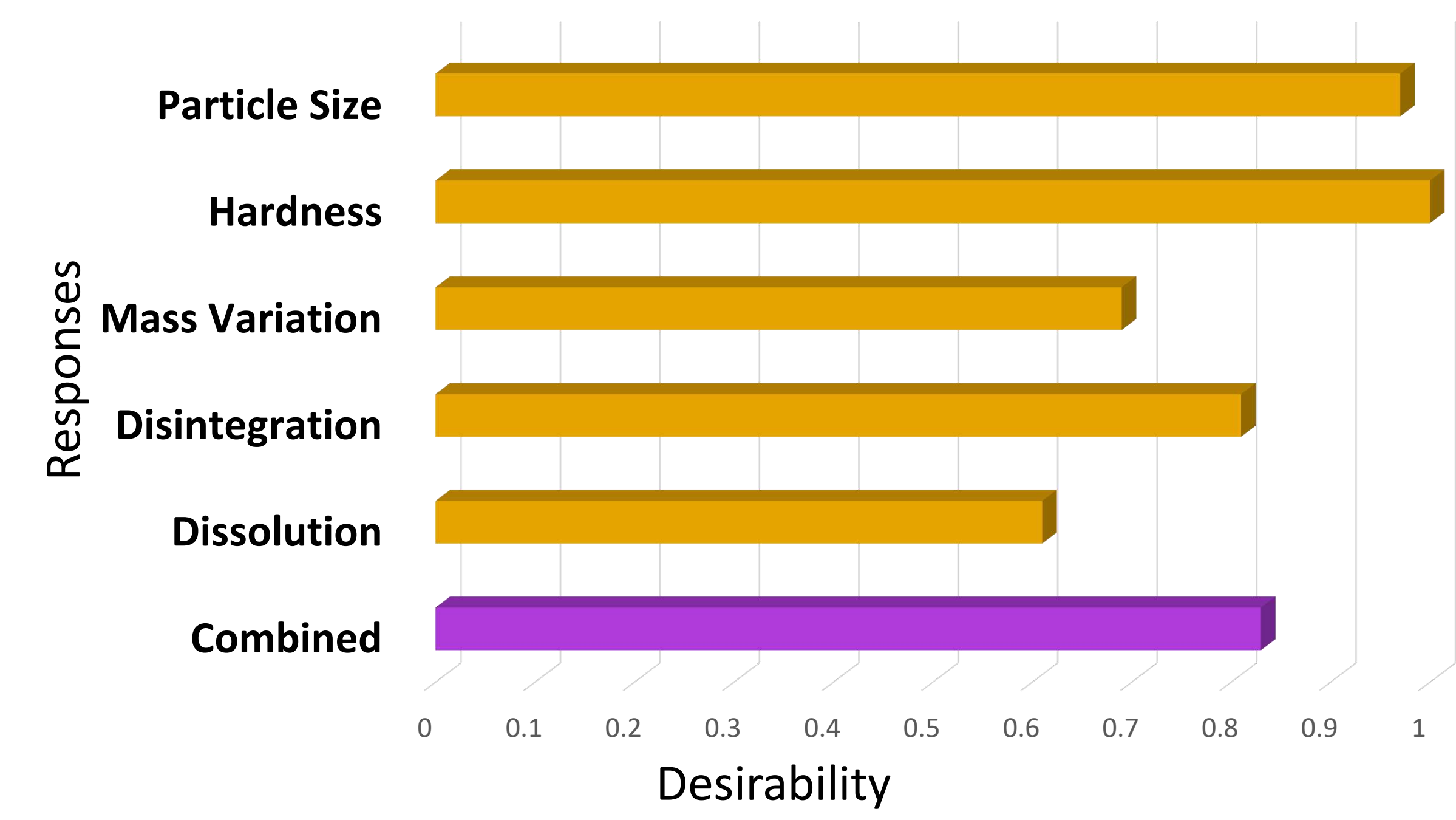


Figure 1: showing the desirability of the factors and attributes in the optimized formula.

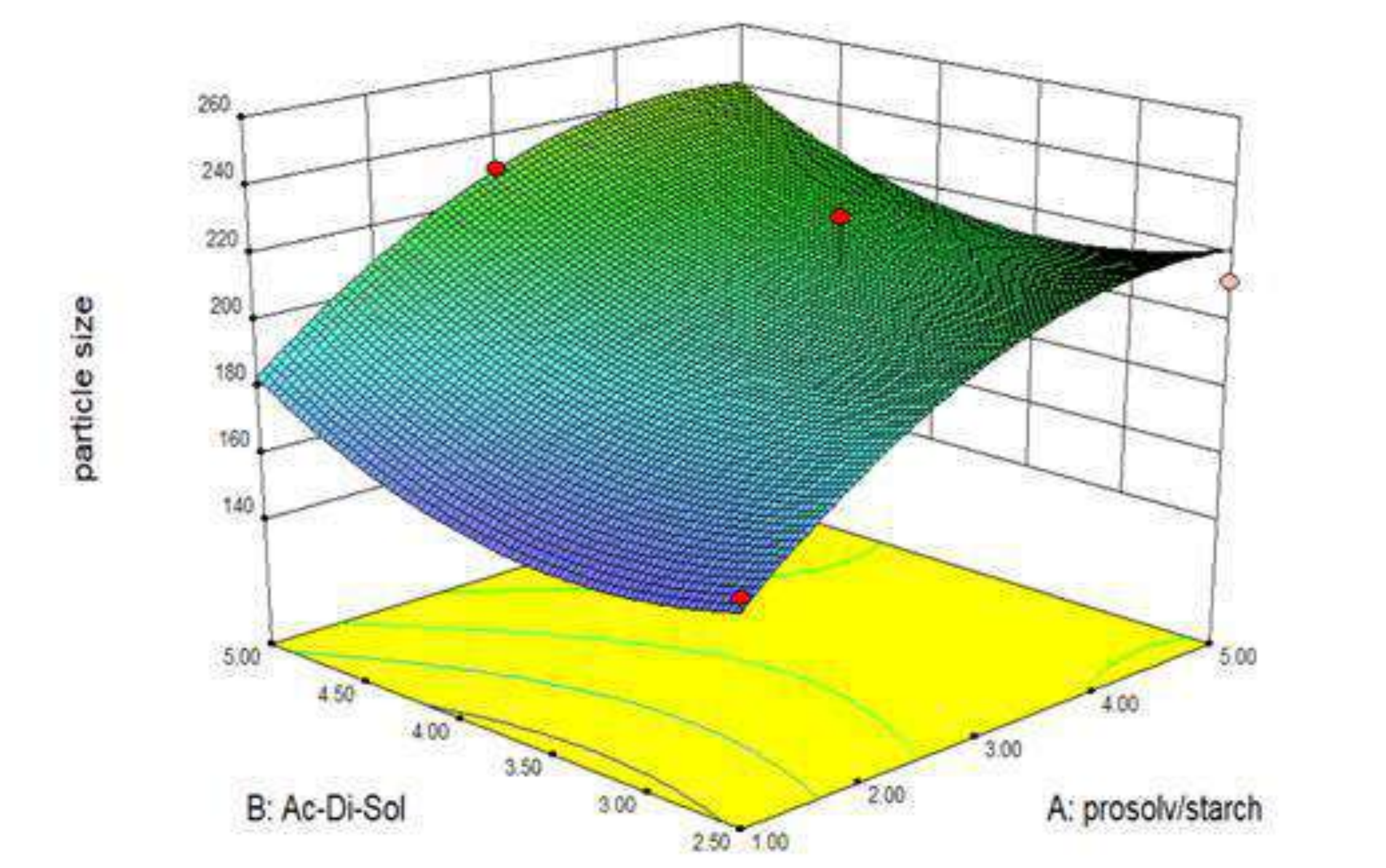


Figure 2: showing the 3D response surface graph for the influence of the factors on particle size



## Methods/Materials

- A **polynomial quadratic factorial D-optimal design** with 4 factors, 3 central points, 5 replications, 27 combinations (formulation experiments) and 8 responses (Design Expert software) was applied to a training set of experimental results to evaluate the influence of the diluent, disintegrant, lubricant and glidant upon the quality attributes of Ibuprofen tablets.

**Table 1 : Quality target product profile (QTPP), selected variables and responses from the risk analysis of the factors influencing the quality attributes, evaluated during the design experiments**

Variables:	
<b>A:</b> PROSOLV to LYCATAB ratio	<b>B:</b> Ac-Di-Sol concentration
<b>C:</b> lubricant/glidant: talc, glyceryl behenate ,or their combination	<b>D:</b> sodium lauryl sulfate: intragranular or extra granular

Responses:
<b>Granules CQAs: Particle size, Hausner ratio, compressibility, porosity; CQAs of the tablets: hardness, mass variation, disintegration and dissolution.</b>
<b>(QTPP)</b> → White tablet with imprinted name, 12 mm diameter and 5,2 mm high, fast dissolution rate: 85% within 15 min at pH 4.6; disintegration rate 3-5 min; hardness 3.5 kg/cm <sup>2</sup> , low friability.



## Results

- Granules' particle size** was most significantly affected by: factors A, C, D, and interactions AD and A<sup>2</sup>.
- Granules' compressibility** was most significantly affected by: interaction CD.
- Granules' porosity** was most significantly affected by: factors A, C, and interaction CD.
- Tablets' disintegration time** was significantly affected by: factors B and C.
- Tablets' dissolution rate** was most significantly affected by: factors A and C.
- The developed quadratic model was significant for five of the responses and polynomial equations were successfully generated:
- The optimized formula was composed of: factor A ratio → 3.00, Factor B → 3.15%, Factor C → Talc and factor D → Intragranular; and it has combined desirability of **0.83 (figure 1)**. The desirability for the dissolution and disintegration rates were above 0.6 and 0.8 respectively.



## Conclusion

- Desirability of dissolution and disintegration which are critical parameters for the bioavailability, safety and efficacy were enhanced.
- DoE, one of the tools of the Quality by design approach, is highly efficient for the allocation and evaluation of the multiple formulation factors affecting the efficacy and safety of dosage forms.
- DoE aids in taking the best decisions during the optimization for improvement of the therapeutic index of drugs.



# Portrayal of Autism Spectrum disorders and related treatments in Qatar's printed media

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## Background

- Autism spectrum disorder (ASD), is a neurodevelopmental condition. Symptoms range from challenges with social interaction, verbal, and non-verbal communication, and restricted or repetitive behavioral patterns. In Qatar, the prevalence rate is 6 to 7 children per 1000 in the low probability group (children in mainstream education).
- In the past 10 years, research on ASD has made a considerable progress, clarifying a number of pathways associated to ASD pathogenesis. New ASD treatments are emerging, including novel drugs, off-label use of available medications, and natural remedies.
- The topic of treatment for ASD has all the ingredients for a sensational media product. Although there is an inherent intent to convey information, there is also potential for influencing consumers on treatments that may not necessarily be evidence-based.

## Study Objectives

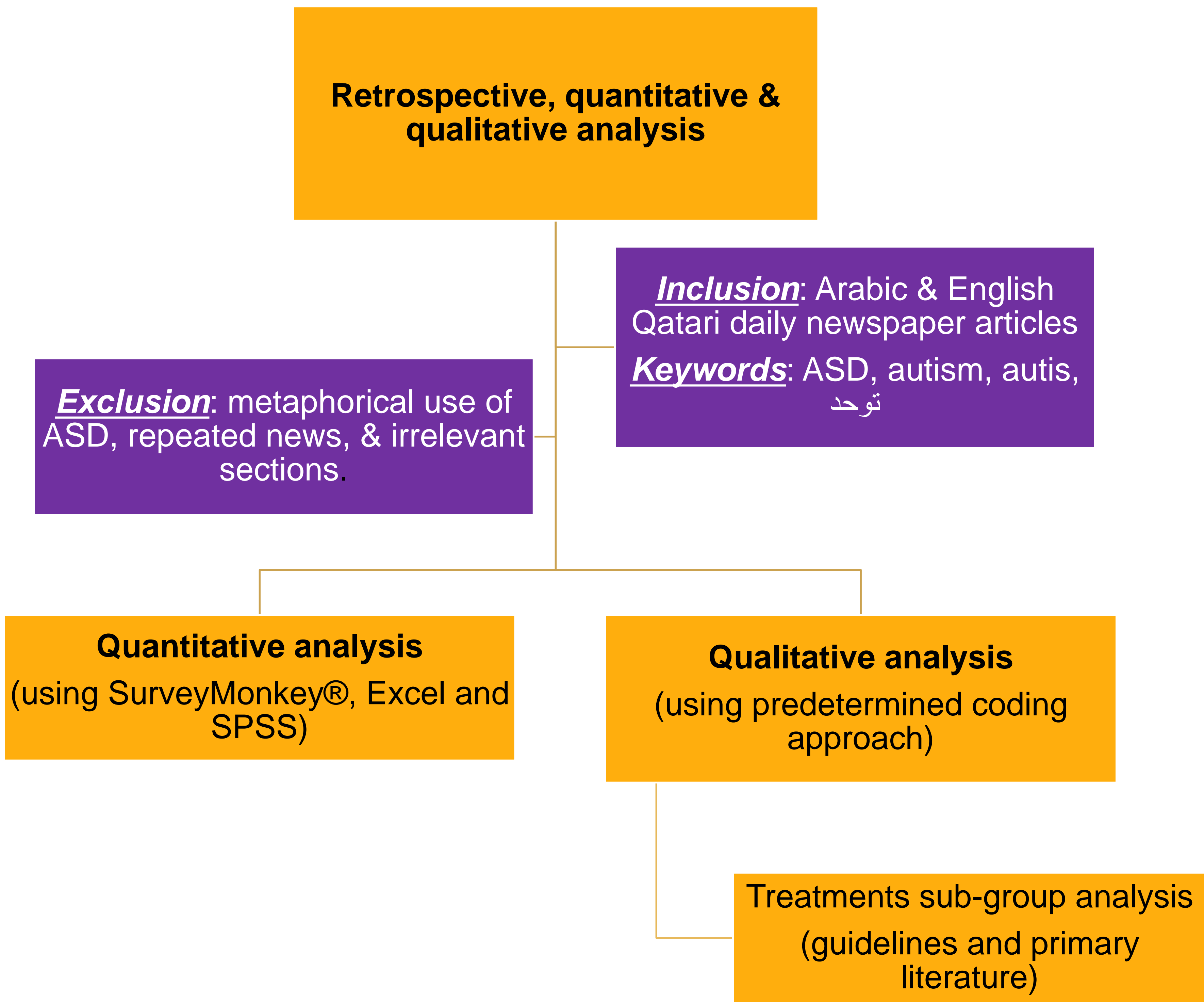
- To have a better understanding of Qatar’s media portrayal of ASD.
- To evaluate how does Qatar’s media consider the evidence behind ASD treatments available.
- To identify areas in need of improvement of the public’s understanding of ASD and its treatments in Qatar.

## Project Questions

- How is ASD portrayed by Qatar’s media?
- How does media describe the benefits and risks associated with ASD treatments?
- Does the media consider the scientific evidence behind ASD treatment?

## Methods

Figure 1: Research strategy



## Methods cont’d

Figure 1 illustrates the research strategy and the methods utilized to explore the portrayal of ASD and its treatments in Qatar’s printed media. Arabic and English Qatari daily newspapers were reviewed for a period of 1 year. Articles with autism spectrum disorder (ASD) as a central or subordinate theme were selected. A retrospective, quantitative, and qualitative content analysis of selected articles was then undertaken. Survey Monkey, Excel, and SPSS software were used for the quantitative analysis. Discourse analysis, utilizing a pre-determined coding approach derived from an extensive review of the literature, was followed for the qualitative thematic analysis. Articles discussing ASD treatments were analyzed separately, by reviewing the scientific evidence as outlined in the Qatar and the American Academy of Pediatrics (AAP) ASD treatment guidelines.

## Results

- A total of 178 ASD-related articles were found in 1 year of published articles.
- Quantitative analysis revealed that the overall attractiveness of these articles was low, most were in relation to general news or local events and had a limited focus on the scientific aspects of this condition or its treatments.
- The discourse analysis revealed significantly more stigmatizing statements in articles in Arabic compared to those in English newspapers. Most of the treatments discussed in the print media had insufficient or lacked scientific evidence.

Table 1: Sub-group analysis for treatments

Types of treatments mentioned	
Nutritional therapy (diets)	Early intervention
Behavioral management	Pet therapy, Equine therapy
Medication treatment	Parent-mediated therapy
Music therapy	Others: stem cell transplant, educational, occupational, physical, speech-language, oxygen, and social skills therapies.

## Conclusions

Results from our studies indicate that there is a need to analyze the journalists’ tone and the treatment recommendations that are being suggested. This will also highlight the gap in this area of research and capture the focus of other researchers. This is important as Qatar has recently implemented “National Autism Strategy” and is making efforts for the inclusion of autism in the society, so there is an increase in the media coverage, including newspapers. It is important for the journalists to realize that they have a responsibility to provide the public with unbiased and accurate information.



# Exploring QU Health Students’ Experiences of Burnout, Anxiety and Empathy during the COVID-19 Pandemic: A Mixed Method Study

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## Background

- **Student burnout** is defined as “feeling exhausted because of study demands, having a cynical and detached attitude toward one’s study, and feeling incompetent as a student”
- Burnout is a growing concern amongst healthcare students, and it has many impacts on their mental health due to the high demands of the medical and health education
- Multiple studies reported positive association between anxiety symptoms and emotional exhaustion and cynicism subscales
- The use of coping strategies decreases the burnout and promotes resilience
- Due to the COVID-19 outbreak, Qatar University halted all classes and shifted to online delivery which may have contributed to increasing the risk of burnout and declining of academic performance

## Objectives

- 1) To assess and describe burnout amongst QU Health students during the COVID-19 pandemic
- 2) To assess the relationship between burnout and anxiety with empathy amongst QU Health students
- 3) To determine the coping strategies of QU Health students during COVID-19 pandemic

## Methods

Design	<ul style="list-style-type: none"><li>▪ Convergent mixed-methods study</li></ul>
Participants & Sampling	<ul style="list-style-type: none"><li>▪ Inclusion: QU Health students (n=1268)</li><li>▪ Exclusion: Students enrolled in fall 2020</li><li>▪ Sampling: Population sampling</li></ul>
Setting and Data Collection	<ul style="list-style-type: none"><li>▪ Settings: Qatar University</li><li>▪ Self-administered online survey that included 6 sections, including: Maslach Burnout Inventory-General Students Survey (MBI-GS(S)), Interpersonal Reactivity Index (IRI), Generalized Anxiety Disorders 7-item scale (GAD-7)</li><li>▪ Focus groups were conducted virtually, audio-recorded and transcribed and used the coping reserve model as a framework for data collection and analysis</li></ul>
Data Analysis	<ul style="list-style-type: none"><li>▪ Quantitative Data: Descriptive statistics and multivariate regression analysis</li><li>▪ Qualitative Data: Deductive thematic analysis</li></ul>
Ethics Approval	<ul style="list-style-type: none"><li>▪ Qatar University Institutional Review Board (QU-IRB)</li></ul>

## Results

- 220 recorded responses for the survey which accounts for 17.4% response rate and participants characteristics are shown in **table 1**
- MBI subscales were assessed individually against GAD-7 statuses (as shown in **table 2**) and against IRI subscales for association with each
- **Figures 1 and 2** represent responses from the students in regards their courses/semester status and their concern about COVID-19 infection, respectively
- 8 focus groups were conducted with 3-10 students each, thematic analysis was done for 4 of them and mapped out based on the coping reserve model as shown in **Figure 3**

## Results...continued

▪ **Table 1. Participant characteristics**

Variable	Mean (SD)	Frequency (%)
Age	21.2 (3.1)	
Gender		
Male		16 (7.3)
Female		204 (92.7)
Nationality		
Qatari		64 (29.1)
Non-Qatari		156 (70.9)
Program		
Biomedical		23 (10.5)
Dental medicine		6 (2.7)
General health sciences		13 (5.9)
Medicine		61 (27.7)
Nutrition		17 (7.7)
Pharmacy		83 (37.7)
Physical therapy		5 (2.3)
Public health		12 (5.5)
Level		
Undergraduate		200 (90.9)
Graduate		20 (9.1)
Year of study		
Year 1		78 (35.5)
Year 2		49 (22.3)
Year 3		48 (21.8)
Year 4		22 (10.0)
Year 5		14 (6.4)
Year 6		9 (4.1)

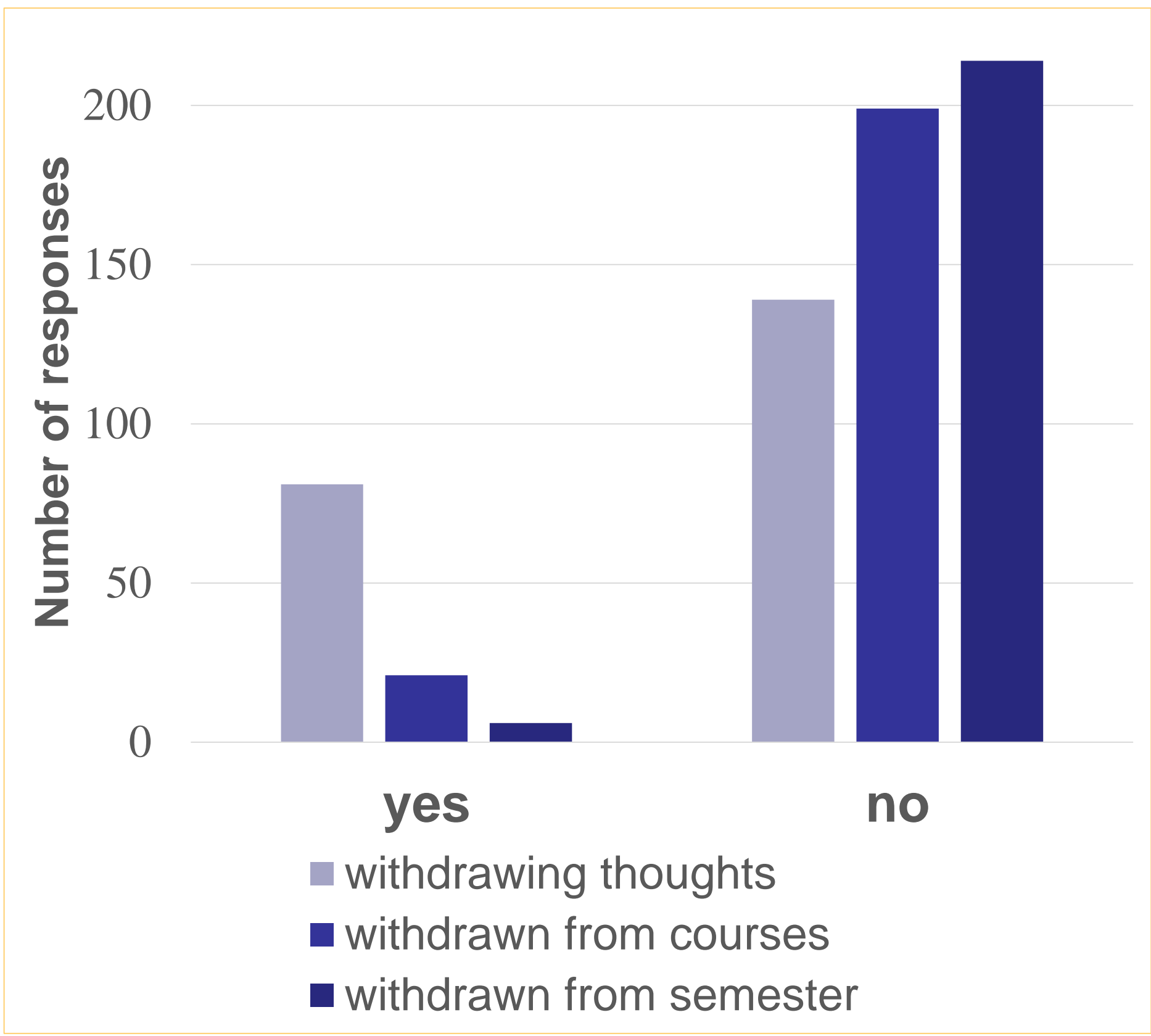


Figure 1. Students withdrawal status in spring 2020

▪ **Table 2. The association between GAD-7 status and each MBI-GS(S) subscale**

Relationship	B	Crude relationship			P-value	B	Adjusted relationship		
		SE	95% CI	SE			95% CI	P-value	
GAD-7 status & MBI-EX									
GAD-7 status									
Minimal	Ref					Ref			
Mild	0.79	0.318	0.19, 1.42	0.017	0.79	0.321	0.14, 1.38	0.023*	
Moderate	1.31	0.360	0.59, 2.04	0.001	1.26	0.353	0.55, 1.95	0.001*	
Severe	1.90	0.316	1.29, 2.54	0.001	1.75	0.357	1.01, 2.44	0.001*	
GAD-7 status & MBI-CY									
GAD7 status									
Minimal	Ref					Ref			
Mild	0.59	0.294	-0.01, 1.14	0.050	0.73	0.294	0.15, 1.35	0.011*	
Moderate	0.87	0.328	0.17, 1.46	0.007	0.97	0.307	0.37, 1.55	0.003*	
Severe	1.45	0.311	0.84, 2.07	0.001	1.44	0.318	0.79, 2.01	0.001*	
GAD-7 status & MBI-PE									
GAD7 status									
Minimal	Ref					Ref			
Mild	-1.0	0.214	-0.51, 0.35	0.669	-0.13	0.224	-0.55, 0.35	0.566	
Moderate	-0.60	0.266	-1.12, 0.08	0.025	-0.56	0.266	-1.11, -0.04	0.039*	
Severe	-0.27	0.253	-0.74, 0.22	0.286	-0.26	0.274	-0.83, 0.25	0.367	

GAD7= Generalized anxiety disorders 7-item scale, MBI-EX= Maslach Burnout Inventory for Exhaustion Subscale, MBI-CY= Maslach Burnout Inventory for Cynicism Subscale, MBI-PE= Maslach Burnout Inventory for Professional Efficacy Subscale, B = regression coefficient, SE = standard error, CI = confidence interval.

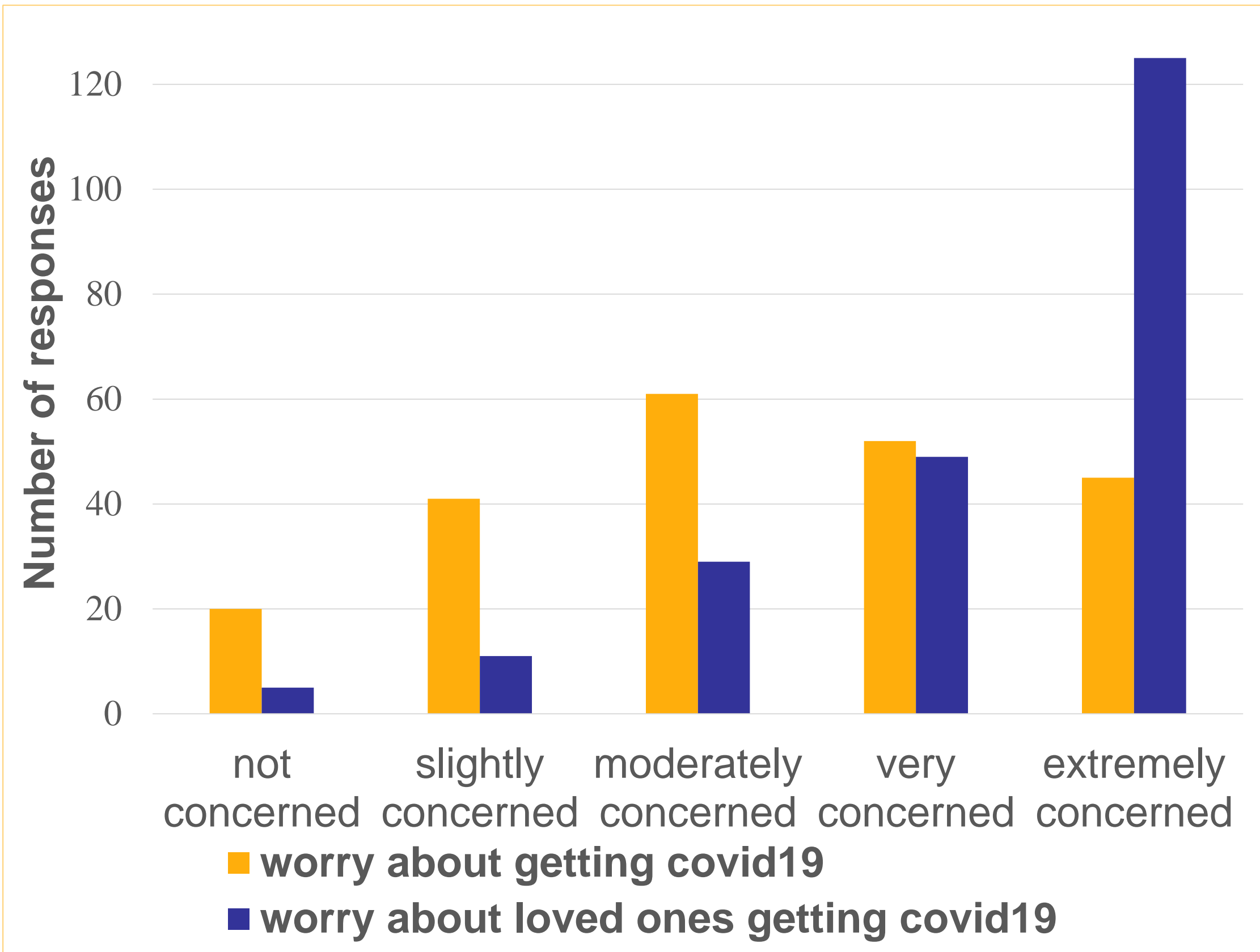


Figure 2. Concerns of COVID-19 infection

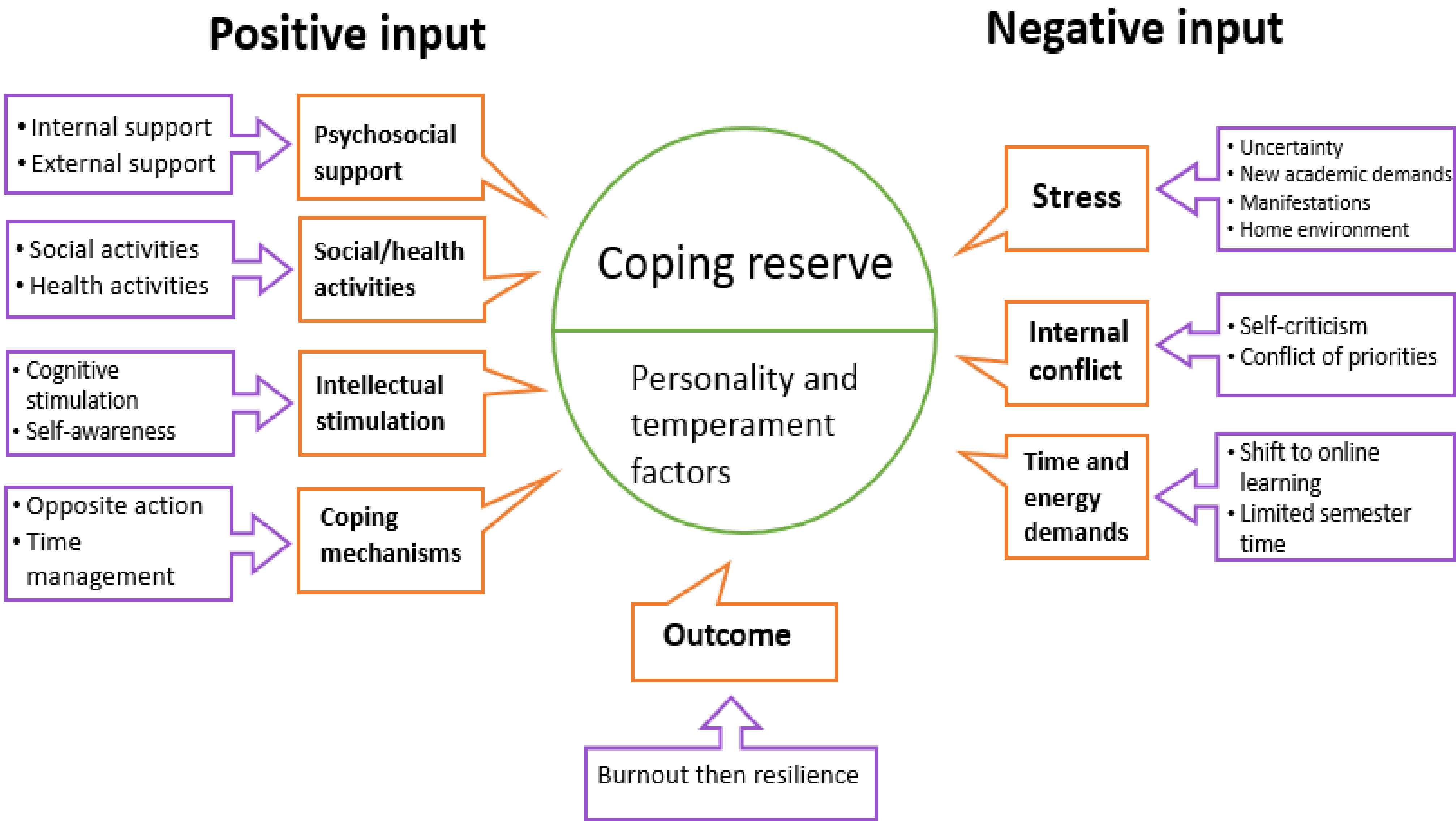


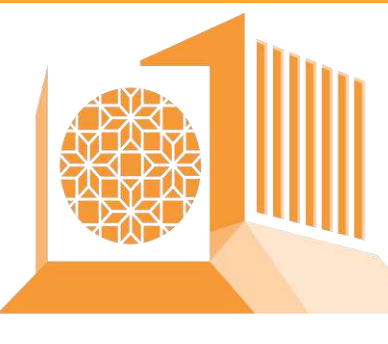
Figure 3. Thematic analysis using the coping reserve model

## Conclusion

- Anxiety is a strong predictor of burnout as higher anxiety levels was associated with higher burnout levels. Additionally, Burnout was associated with some of the IRI subscales
- Most prominent themes extracted from focus group discussions were uncertainty, manifestations of stress, and the shift to online learning
- Students used different coping strategies to adapt with the pandemic and build resilience
- Recommended actions: mentorship program, provision of training on online learning delivery
- Limitations: Small response rate and the survey length
- Recommendation for future research: future research investigating burnout on non-healthcare students, university faculty members, and investigating the effect of students’ burnout on professionalism

## Acknowledgment

We would like to thank all students who have participated in this study and all the faculty who provided their constructive feedback on the survey: Ms. Myriam Eljaam, Ms. Layan Sukik, Dr. Monica Zolezzi, Ms. Reem EL Hage, Dr. lily O’Hara, and Ms. Sawsan AIMukdad



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# Burnout and Resilience in Community Pharmacists in Qatar during the COVID-19 Pandemic: a Mixed Method Study

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## Background

- Community pharmacists are the most accessible healthcare providers during the pandemic which puts them at risk for experiencing mental health issues.
- Burnout is an occupational phenomenon that is defined by the World Health Organization (WHO) as chronic workplace stress (1).
- Resilience is the process of adapting and the ability of bouncing back when facing adversity, tragedy, trauma, or stress (2).
- Many studies have identified moderate to high levels of burnout among HCP; however, little is known about this syndrome in Qatar.

## Study Objectives

- Characterize the level of burnout and resilience among community pharmacists during the COVID-19 outbreak in Qatar.
- Assess the symptoms of stress, anxiety, depression and fear in community pharmacists in Qatar.

## Methods

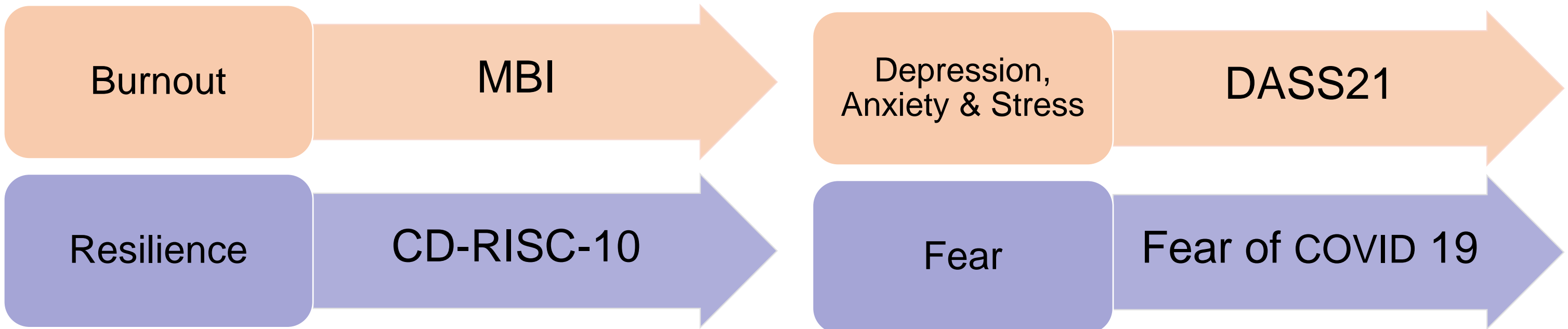
### Study Design

- Mixed-method explanatory sequential design.
- Phase I: collection and analysis of quantitative data using a survey.
- Phase II: collection and analysis of qualitative data through virtual focus group.

### Target Population

- Community pharmacists practicing in Qatar.

### Survey Measures



### Data Analysis

- Data were analyzed using SPSS® version 26.0.
- Descriptive statistics were used to report frequencies and percentages for categorical variables and mean ± standard deviation for continuous variables.
- Chi-square test, Independent two-sample t-test and Pearson correlation coefficient were used to examine any differences in the study outcomes between multiple pharmacists' characteristics.

## Results

- 103 community pharmacists out of 330 (31.2%).

Table 1. Pharmacists' Sociodemographic

Characteristic	Mean (SD)	Frequency (Percent)
Age (N=102)	36.85 (8.238)	
Gender (N=102)		
Male		61(59.8%)
Female		41(40.2%)
Country of origin (N=102)		
Arabs		46(45.3%)
Non-Arabs		56(54.7%)
Marital status (N=102)		
Single		19(18.6%)
Married		76(74.5%)
Other		7 (7.0%)
Number of children (N=78)	1.68(1.157)	
Current living arrangement (N=102)		
Alone		33(32.4%)
With family		56(54.9%)
With coworkers		13(12.7%)
Highest pharmacy degree (N=101)		
BPharm/BSc Pharm		71 (70.3%)
PharmD		8(7.9%)
MPharm		18(17.8%)
MSc		4(4.0%)
Community pharmacy type (N=101)		
Independent single pharmacy		16(15.8%)
Chain pharmacy		79(78.2%)
Other †		6(5.9%)
Type of employment (N=102)		
Part time		5(4.9%)
Full time		97(95.1%)
Average hours of work per week in pharmacy (N=98)	45.58(13.603)	
Approximate patients per day (N=100)	76.28(72.292)	
Approximate prescriptions filled per day (N=99)	22.98(40.921)	
Average personally rewarding hours per day (N=98)	4.11(3.075)	

† Clinic pharmacy, warehouse

Table 2. Mean scores of mental health outcomes

	Mean (SD)	Possible Range
MBI <sup>a</sup>		
EE <sup>1</sup>	22.11 (13.053)	0-54
DP <sup>2</sup>	7.17 (6.55)	0-30
PA <sup>3</sup>	35.94 (11.471)	0-48
Resilience <sup>b</sup>	35.7(8.57)	0-40
DASS-21 <sup>c</sup>		
Depression	4.837(4.538)	0-21
Anxiety	4.533(3.988)	0-19
Stress	5.641(4.189)	0-21
Fear <sup>d</sup>	25.720 (8.569)	0-27

<sup>a</sup> MBI-HSS for MP: Maslach Burnout Inventory: Human Services Survey for Medical Personnel (N=103)

<sup>1</sup> EE=emotional exhaustion. <sup>2</sup> DP=depersonalization. <sup>3</sup> PA=personal accomplishment.

<sup>b</sup> Resilience: CD-RISC-10: Connor-Davidson Resilience Scale-10 (N=93)

<sup>c</sup> DASS-21: The Depression, Anxiety and Stress Scale (N=93)

<sup>d</sup> Fear of COVID-19 Scale (N=93)

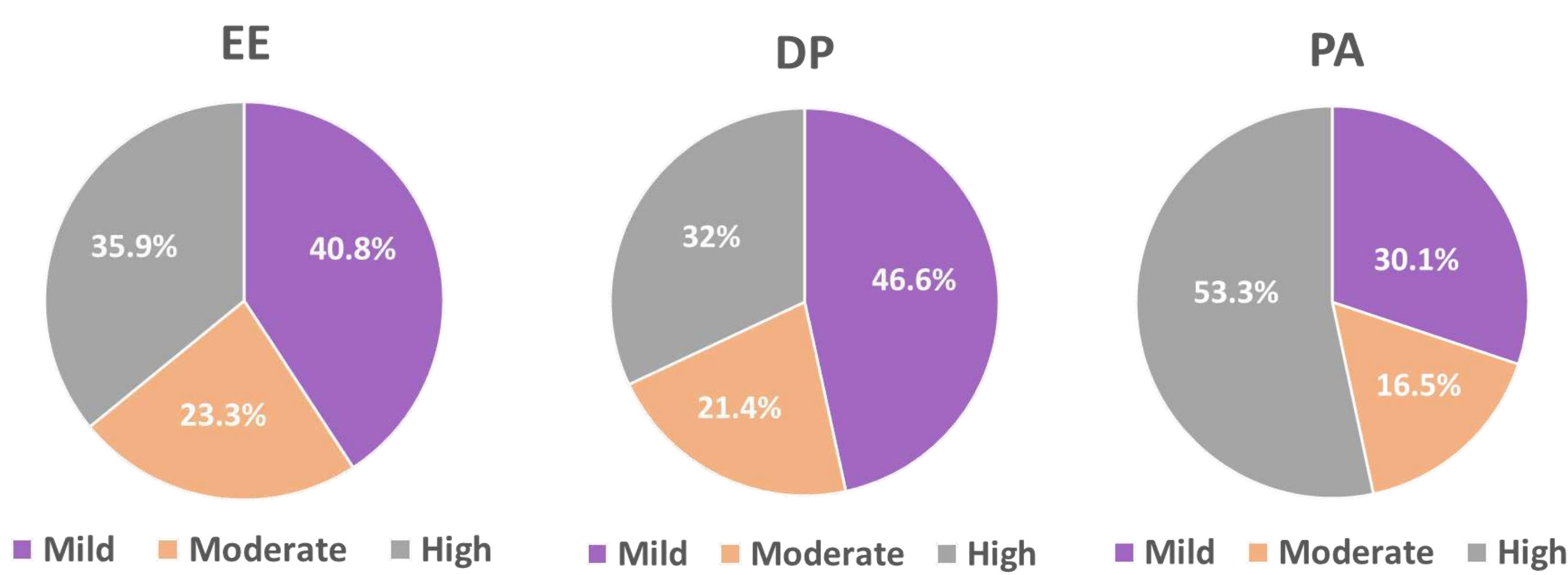


Figure 1. Percentage of severity categories for MBI

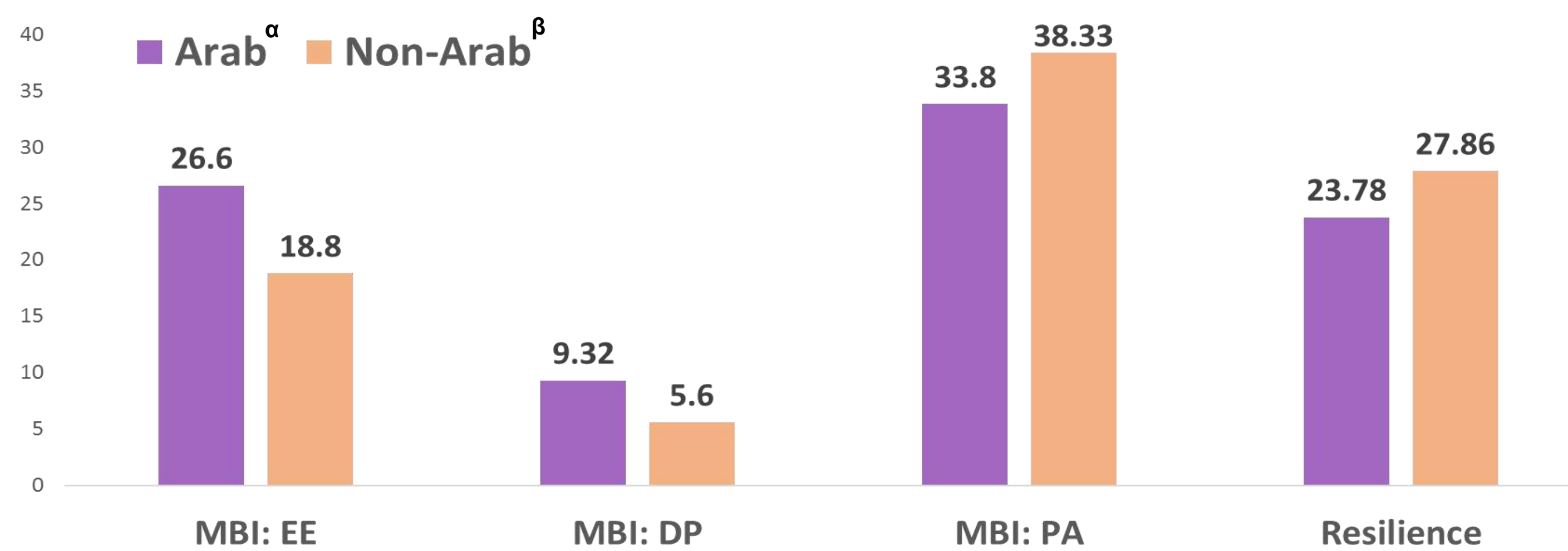


Figure 2. Mean scores between Arabs and Non-Arabs

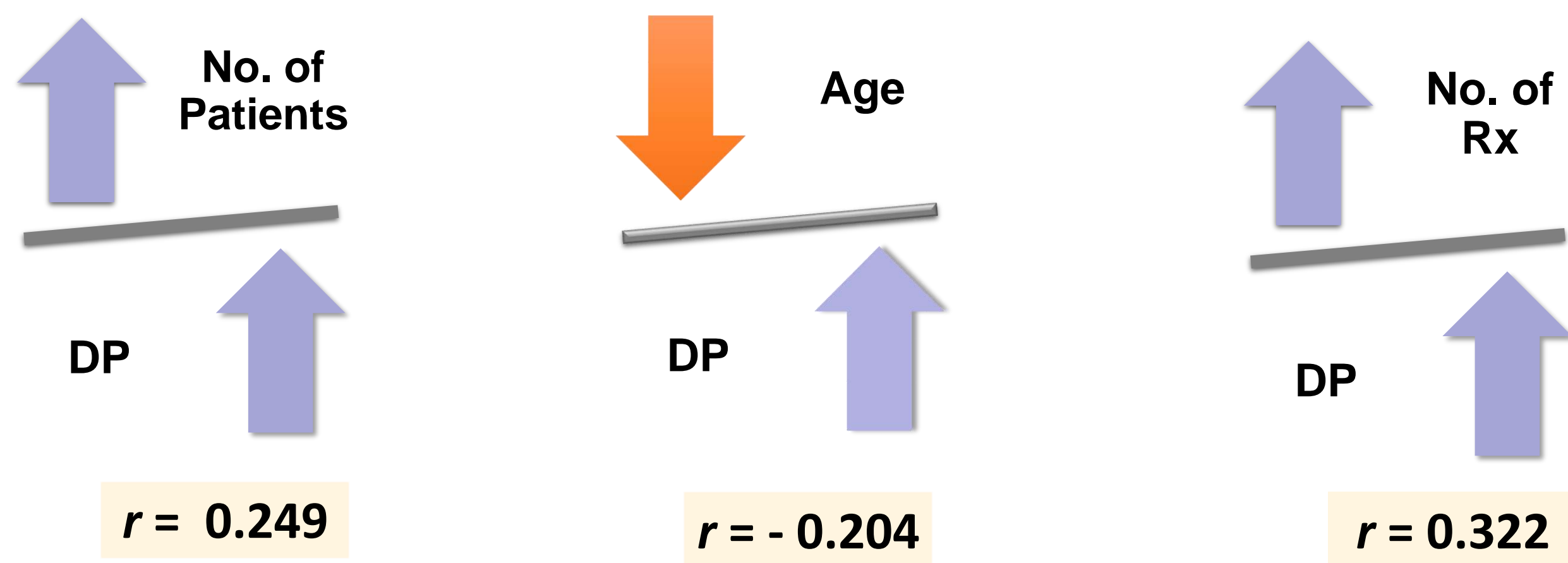


Figure 3. Correlation between MBI:DP and characteristics

## Limitations

- Small sample size (low response rate).
- Social desirability bias might have affected the results.
- Phase II was not completed due to time constraint.

## Conclusions

- The pharmacists experienced moderate burnout but high resilience, which indicates their high potential to overcome difficulties.
- The levels of fear were high, however there were low levels of depression, stress, and anxiety.
- For future research, longitudinal and qualitative studies are recommended, to develop and implement psychological interventions to improve burnout.



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<sup>α</sup> Arabs: Qatar, Egypt, Jordan, Syria, Iraq.

<sup>β</sup> Non-Arabs: India, Philippines, Pakistan, Nepal, Australia.

<sup>1</sup> World Health Organization. Burn-out an "occupational phenomenon". International Classification of Diseases 2019 [Available from: <https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases>

<sup>2</sup> Association AP. The road to resilience. <http://helping.apa.org/resilience/>. 2004



# Reno-Protective Effects of Angiotensin Receptor Blockers in Hypertensive Rodent Models: A systematic review

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## Background

- Essential hypertension is a major risk factor for chronic kidney disease.
- The is no conclusive evidence that lowering blood pressure alone significantly improves renal function.
- Based on animal studies on hypertensive models, angiotensin-II receptor blockers (ARBs) are proposed to have a protective renal effect that is independent of blood pressure lowering.
- Clinical evidence of the reno-protective effect of ARBs in hypertensive patients is lacking.
- Some preclinical evidence exists. However, no structured assessment for the preclinical evidence has been done to serve as preclinical baseline hypothesis.

## Study Objective

- The objective of this study was to structurally assess the evidence from preclinical murine models on the reno-protective effect of ARBs in hypertensive population to provide a high quality pre-clinical baseline for future investigations.

## Methods

- Search Strategy:**
  - Systematic review following PRISMA checklist for quasi-experimental murine studies.
  - Four databases were searched including; PubMed, EMBASE, Scopus and ScienceDirect.
  - Keywords words include; hypertension AND (rats or mice) AND (renal or kidney) AND ARBs (with synonyms and names of single agents) and NOT patients
- Search was limited to English articles published between 2000 and 2020.
- Study Selection:**
  - Included articles were studies conducted on hypertensive rats or mice, reporting means and standard error of mean (SEM), with moderate or high quality and reporting any of the predetermined outcomes.
  - Excluded articles were studies with low quality, studies with designs other than quasi-experimental designs or studies not following any point in the inclusion criteria
  - Deduplication was done in duplicate, screening was done as single screening then a sample of 100 articles were double screened to insure consistency
- Quality Assessment**
  - The quality was assessed using Joanna Briggs Institute criteria for quasi-experimental studies.
  - Two reviewers (SA and MH) independently assessed the quality of the included studies and the decision was made with an agreement between both reviewers.

### Outcomes of interest

- The study looked into four main outcomes reported as means and SEM, including creatinine clearance, proteinuria, albuminuria and/or BUN

### Data Extraction

- Data extraction was performed by the two reviewers independently.
- Extraction was mainly for hypertensive animal model, baseline characteristics, intervention and comparators, reduction in blood pressure (if reported) and exclusion of diabetic models.

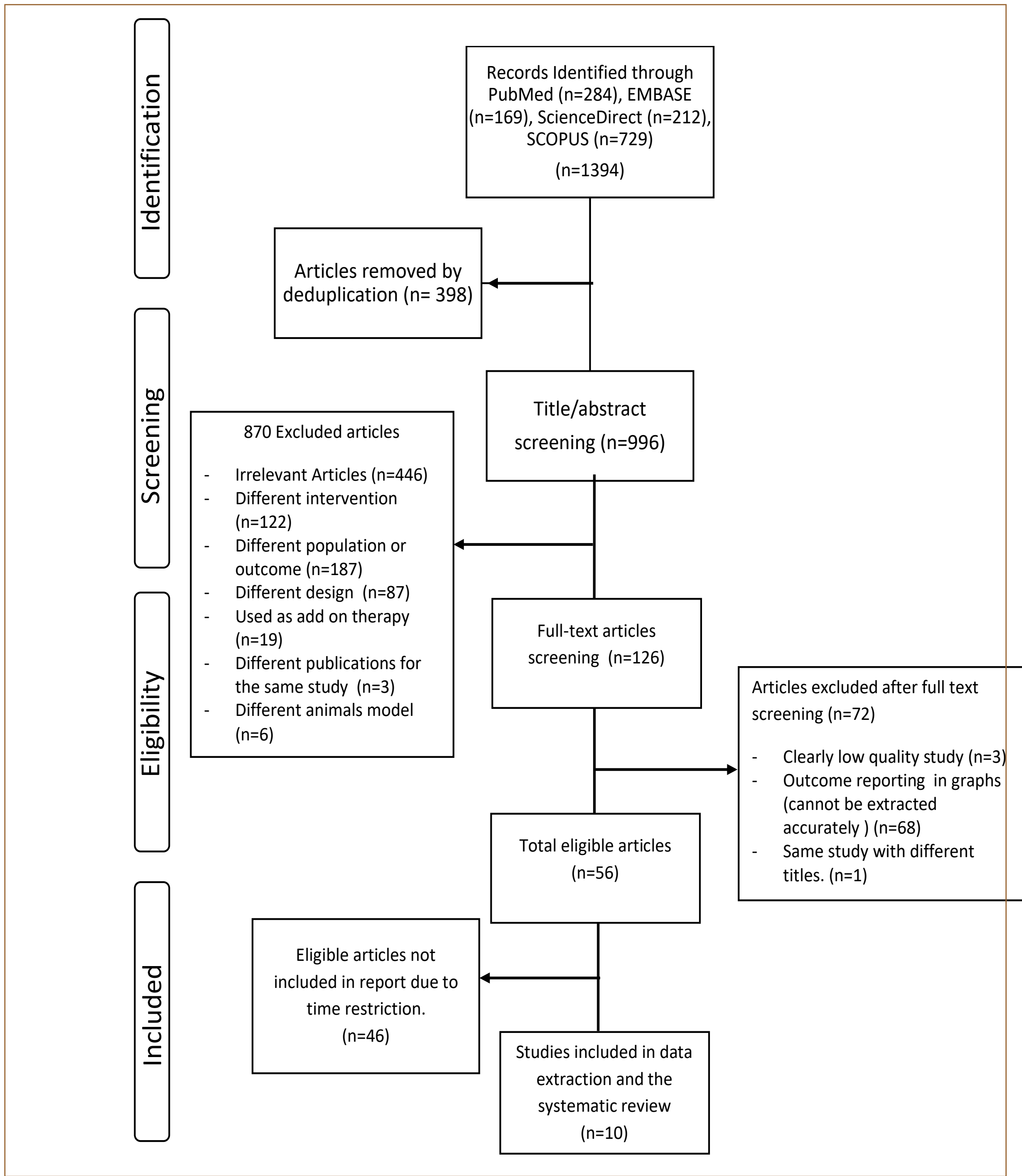


Figure 1. The flow chart for screening and inclusion

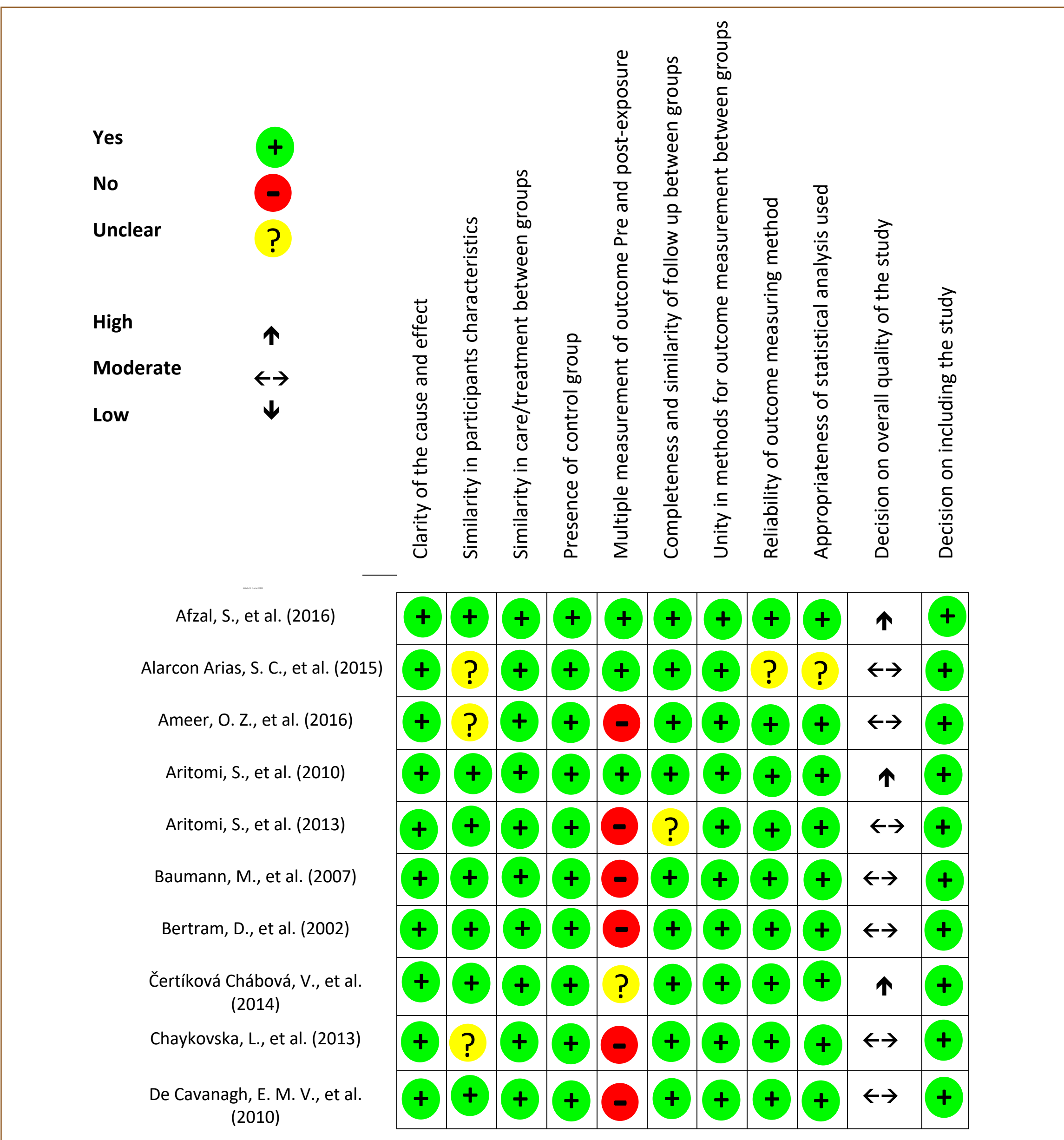


Figure 2. JBI quality assessment for included studies

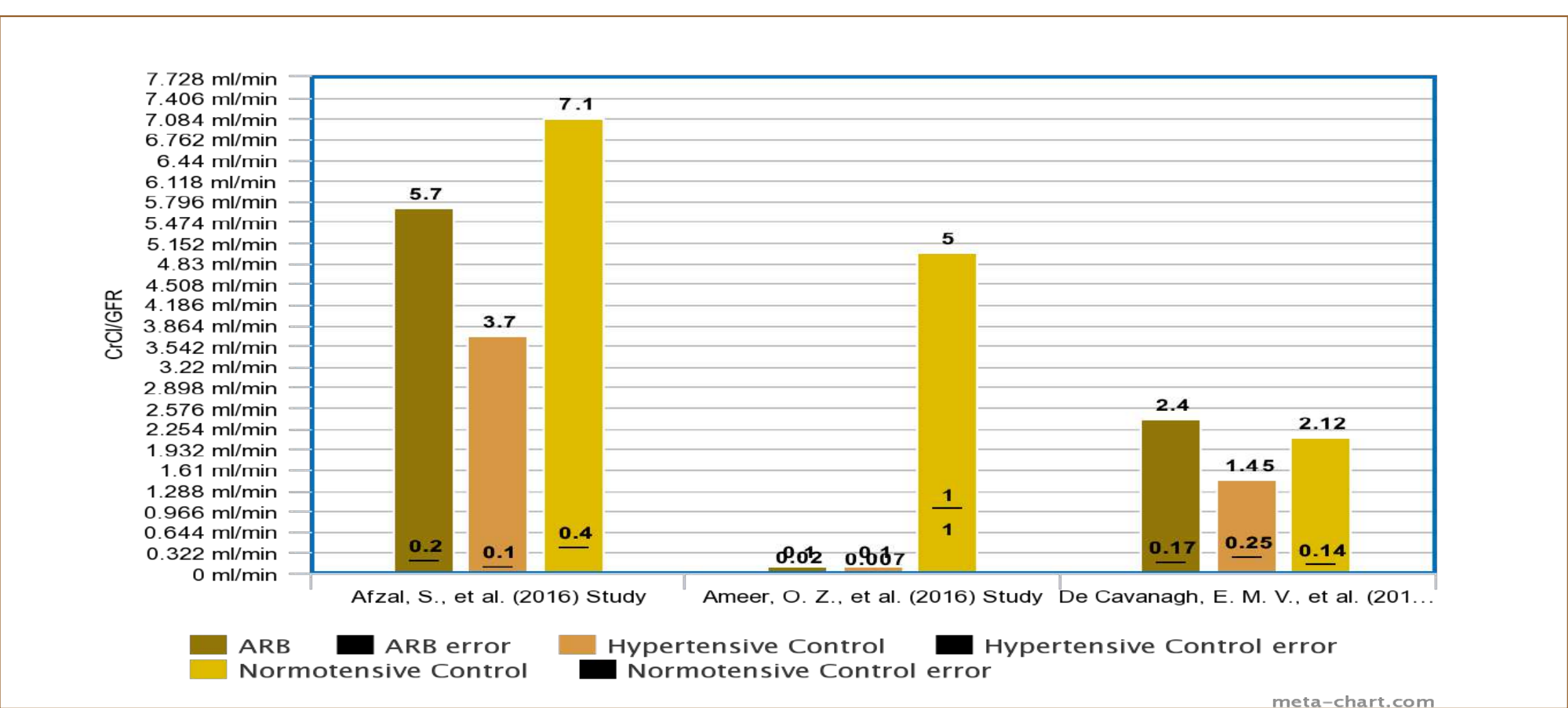


Figure 3. CrCl of ARBs vs HTN and normotensive control

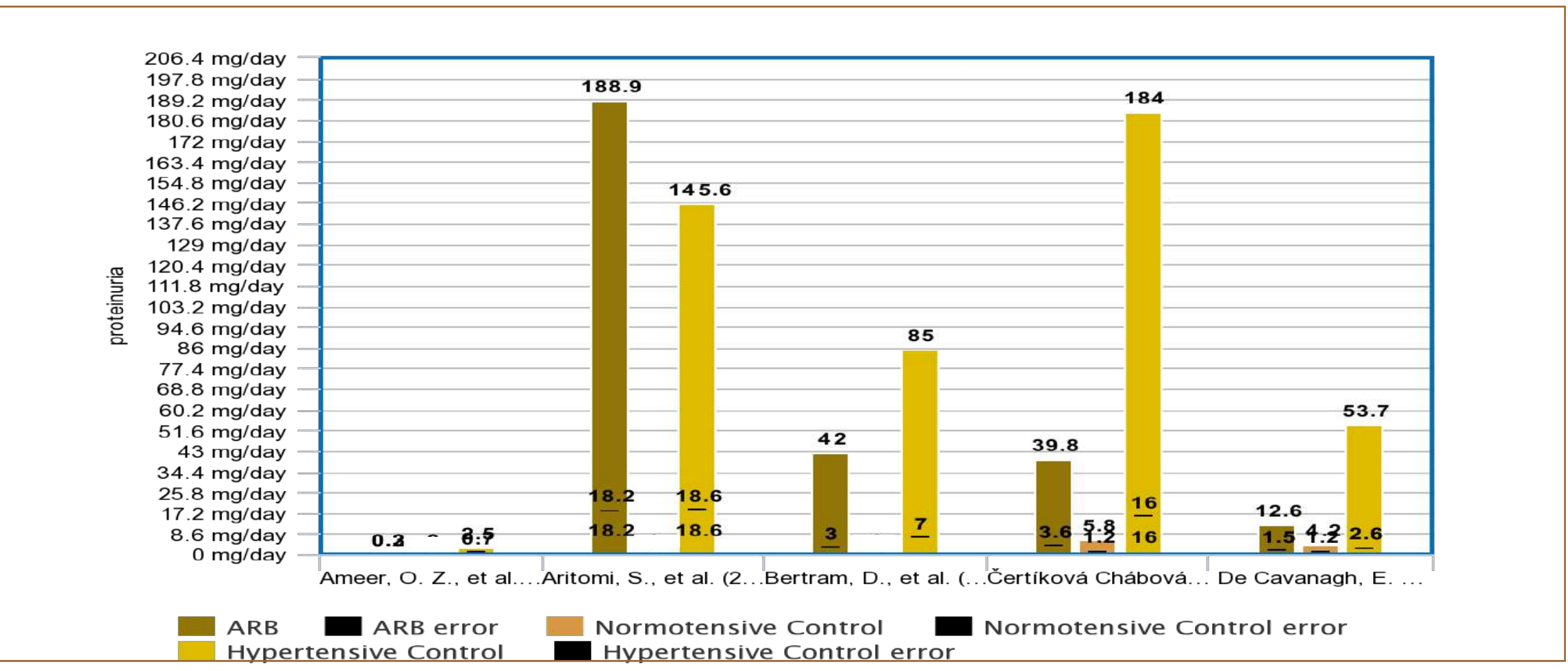


Figure 4. Proteinuria of ARBs vs HTN and normotensive control

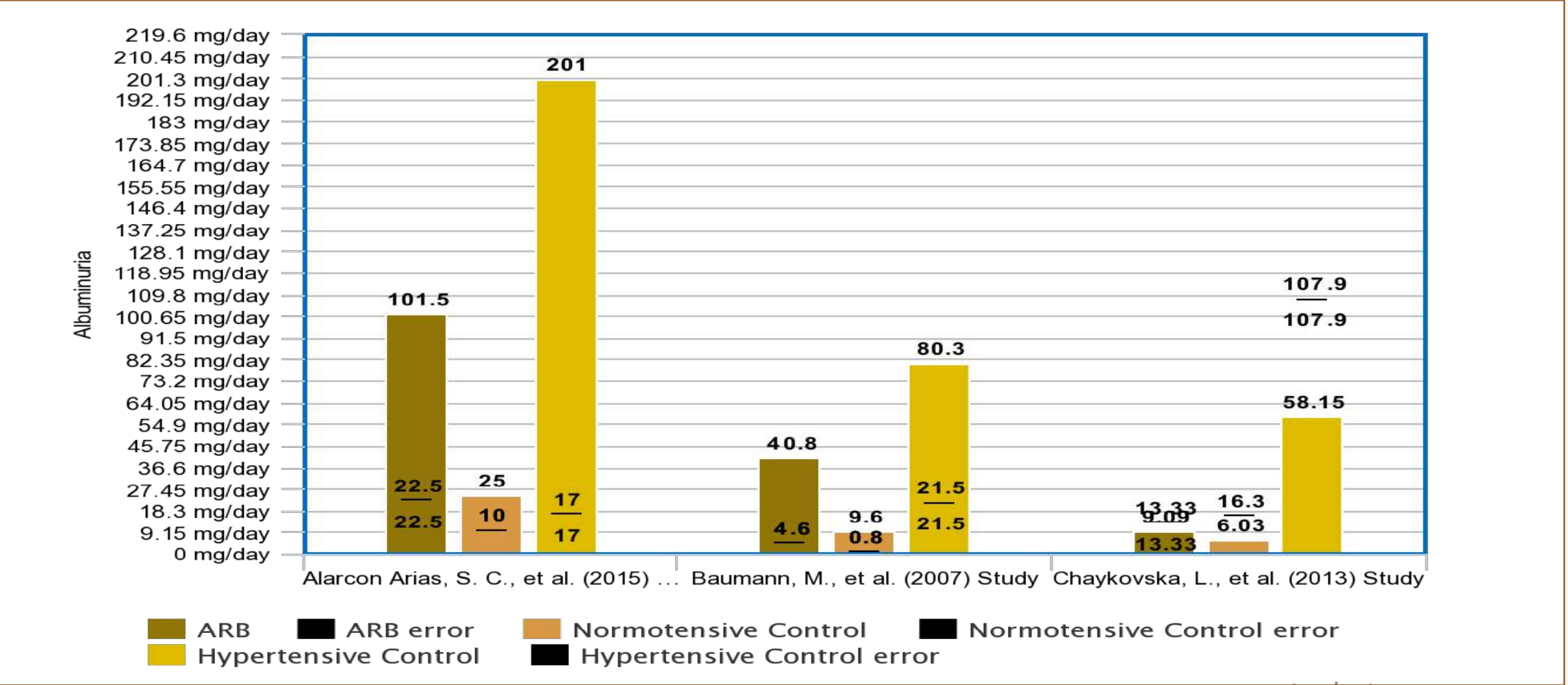
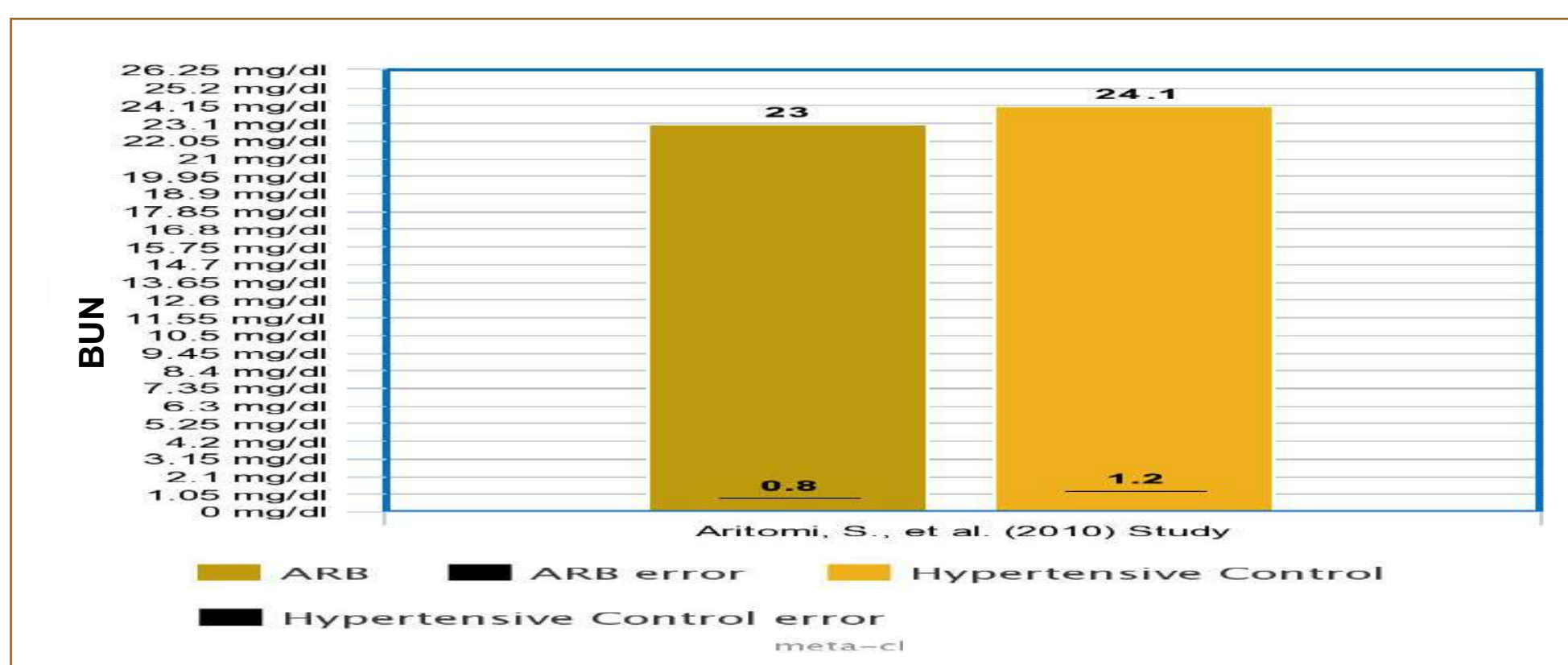


Figure 5. Albuminuria of ARBs vs HTN and normotensive control



Figures 6. BUN of ARBs vs HTN and normotensive control

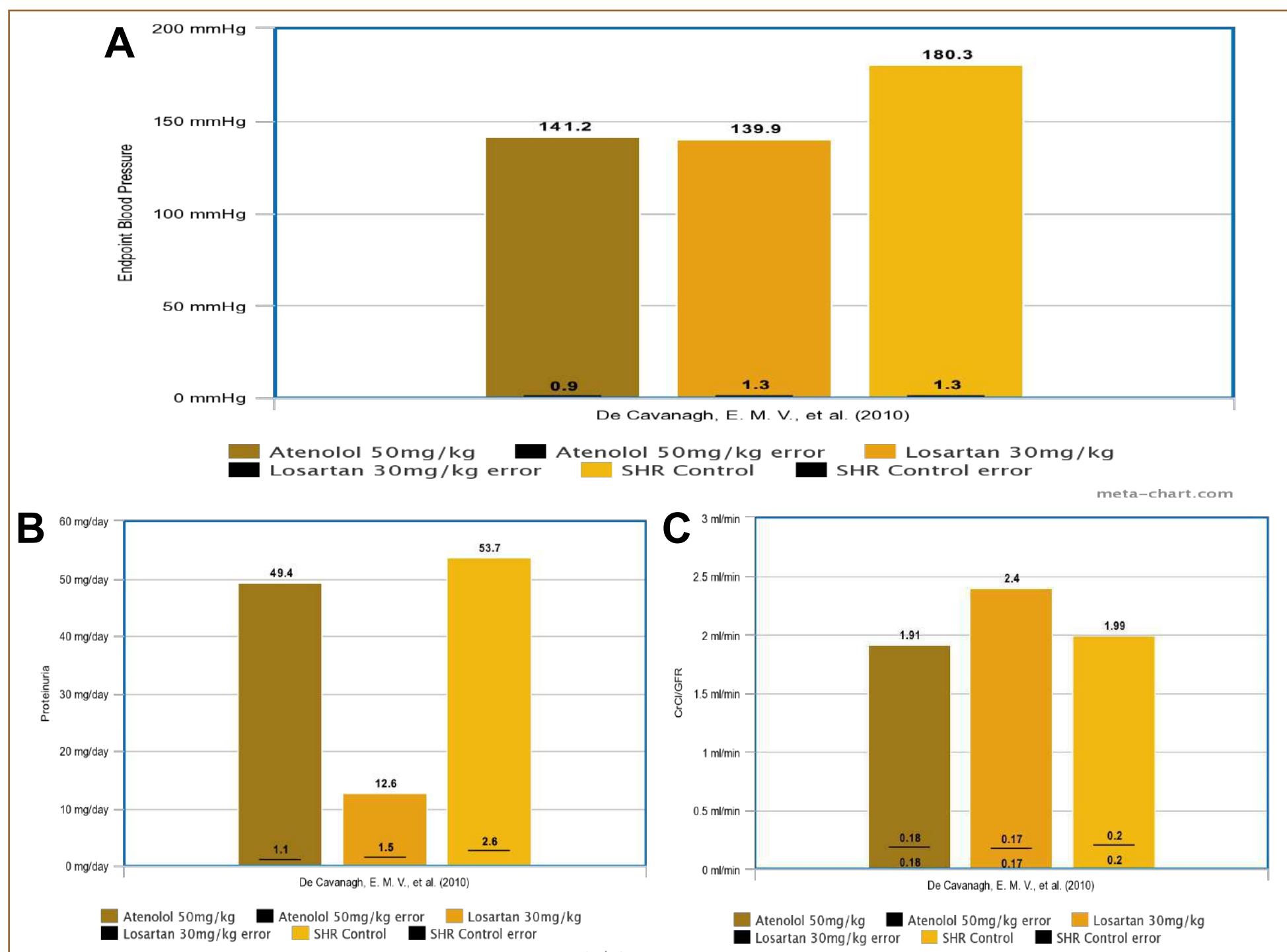


Figure 7. The endpoint BP (A), proteinuria (B), and CrCl (C) for atenolol 50mg vs losartan 30mg vs hypertensive(SHR) control.

## Results

- Literature Search**
  - 996 article remained after deduplication.
  - 126 remaining after title-abstract screening.
  - 56 were eligible after full test screening.
  - Quality assessment done for 13 articles.
  - Data were extracted from ten articles identified to have moderate or high-quality and were included in the preliminary analysis.
- Included Studies**
  - Ten studies conducted on a total of 537 rats.
  - Four ARBs were reported in the ten studies, including; irbesartan (n=1), losartan (n=5), valsartan (n=3) and telmisartan (n=1).
  - GRF/CrCl was reported in three studies. Two studies showed significant increase and one study showed no difference. Figure 3. represents average GFR from these studies.
  - Proteinuria was reported in five studies. Four out of five studies showed significant reduction in proteinuria. Figure 4 represent average urinary protein excretion in one day for ARBs vs controls.
  - Albuminuria was reported in three studies and all studies had significant reduction. figure 5. represents data from these studies.
  - BUN was reported in one study with no significant difference. Figure 6. presents the data.

## Limitations

- The review did not include all eligible studies due to time limitations.
- Variations in models of HTN, administered doses or agents contributed to variations in results.
- Inclusion was restricted to English articles only which might have contributed to missing eligible articles

## Conclusions

- Initial data are encouraging. ARBs have shown reno-protective effect in different hypertensive models in eight of ten studies.
- Primary results from one study (figure 7.) support that the reno-protective effect is independent of blood pressure lowering effect.
- Reno-protective effect was seen with all agents at appropriate dosing and results would be further empowered after the completion of this review.



# Bibliometric Analysis of Scholarly Output on Cardiovascular Disease-Related Research in Qatar: A Preliminary Analysis

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## Background

- Cardiovascular diseases (CVDs) are the **leading cause** of death from noncommunicable diseases in Qatar
- Qatar National Research Funds (QNRF), Qatar University (QU), and other institutions have identified CVD-related research as a **priority** research area
- Qatar allocates a huge amount of funding and **investment** for CVD-related research
- No enough data in the literature about CVD research activity and productivity in Qatar

## Study Objective

- The objective of this study was to evaluate the **quantity and quality** of CVD-related research in Qatar over the last 20 years.

## Methods

Study Design	Bibliometric analysis
Databases	Scopus, Web of Science, PubMed, Cochrane Library
Inclusion Criteria	CVD-related papers published in online journals Between 2000 - 2020
Data extracted	Publication-related parameters Journal metrics
Data analysis	Microsoft Excel SPSS version 26

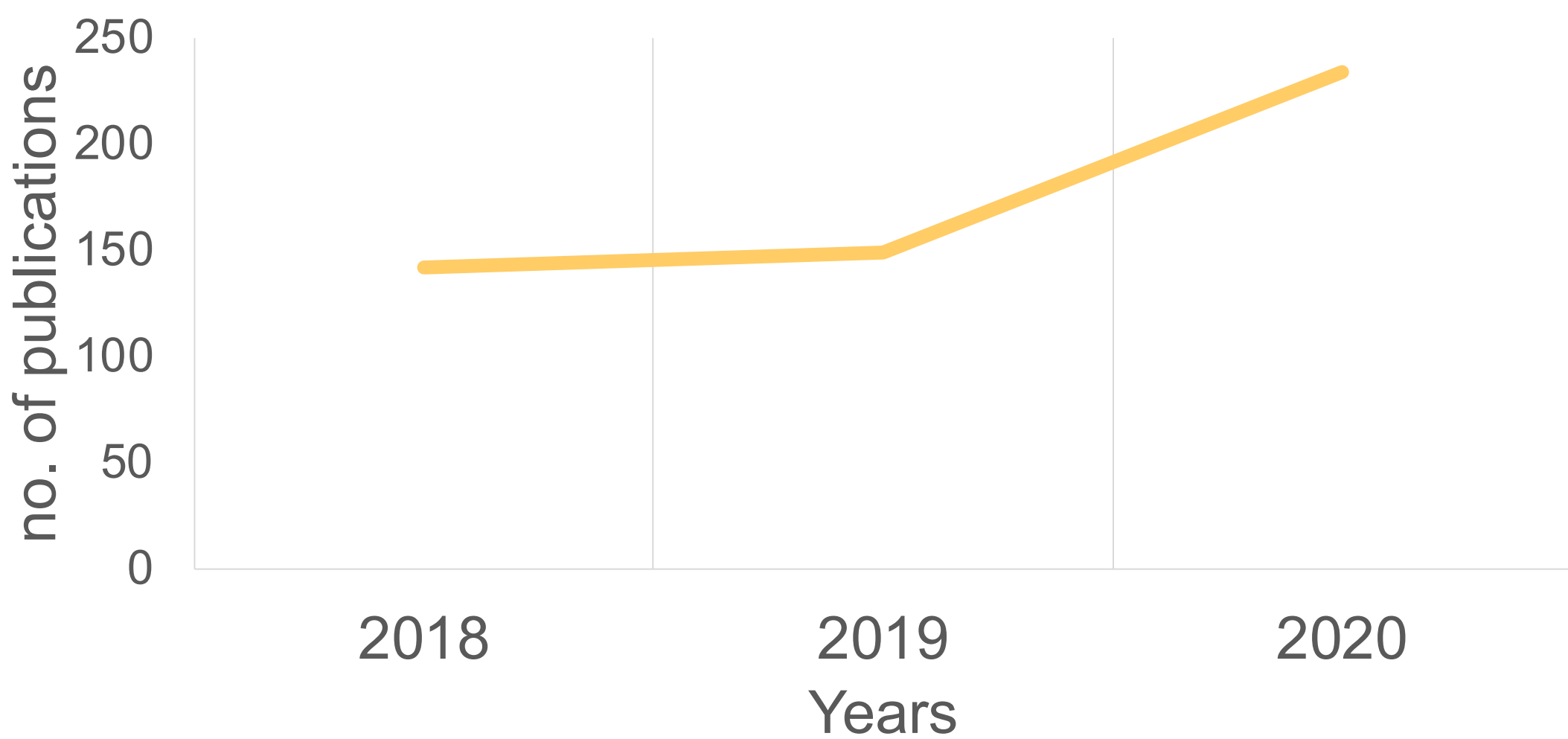
## Interim Results

- 20 years (2000-2020): 1385 CVD-related publications identified
- 3 years (2018-2020): **534** CVD-related publications identified
- 85% of the publications were **applied** research, while 15% were **basic** research publications
- 83% of publications were indexed in **Scopus**, while 90% of publications were indexed in **Web of Science**

## Publications Related Parameters

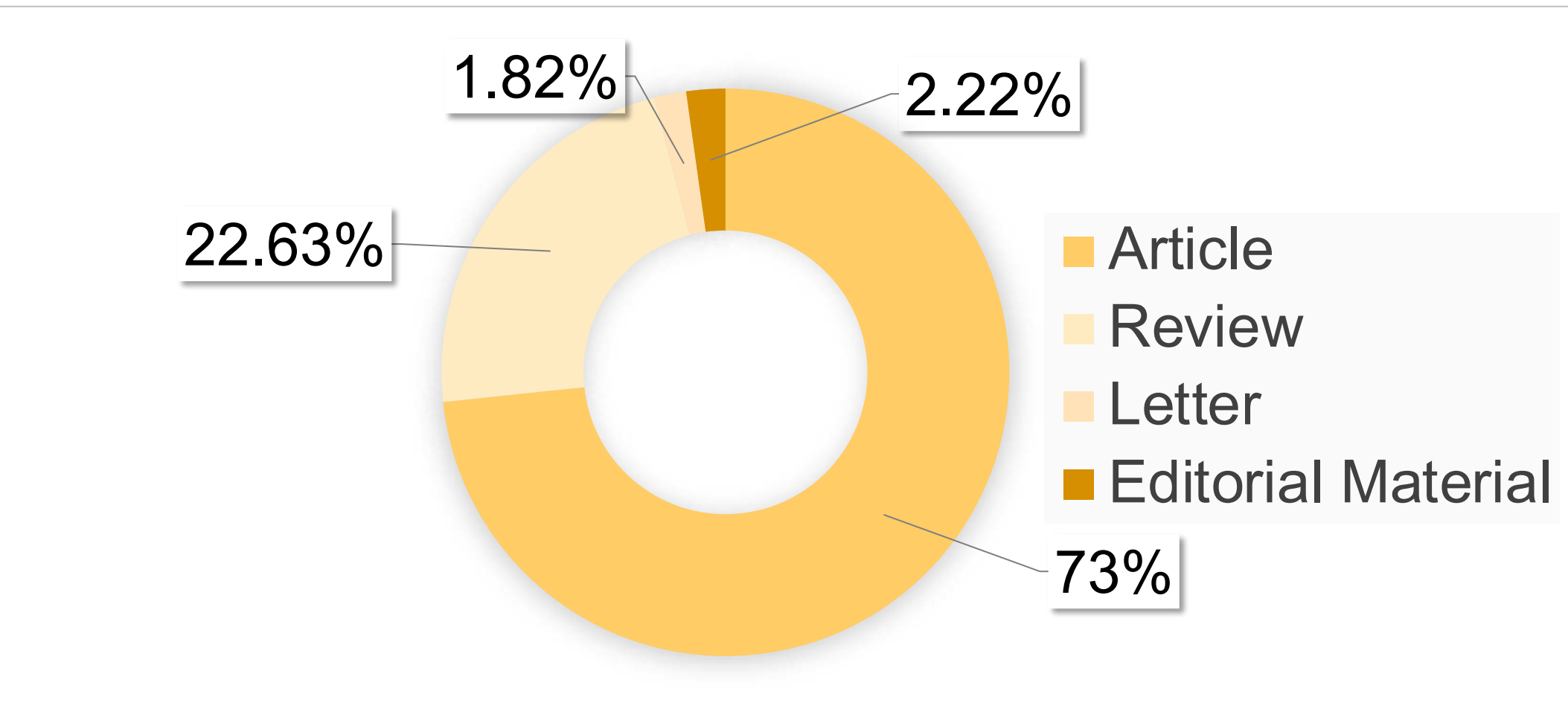
### Number of publications per year (Figure.1)

- There is a noticeable **upward trend** over the 3 years with an increase of more than 40% from 2018 to 2020
- Average of 178 publications/year



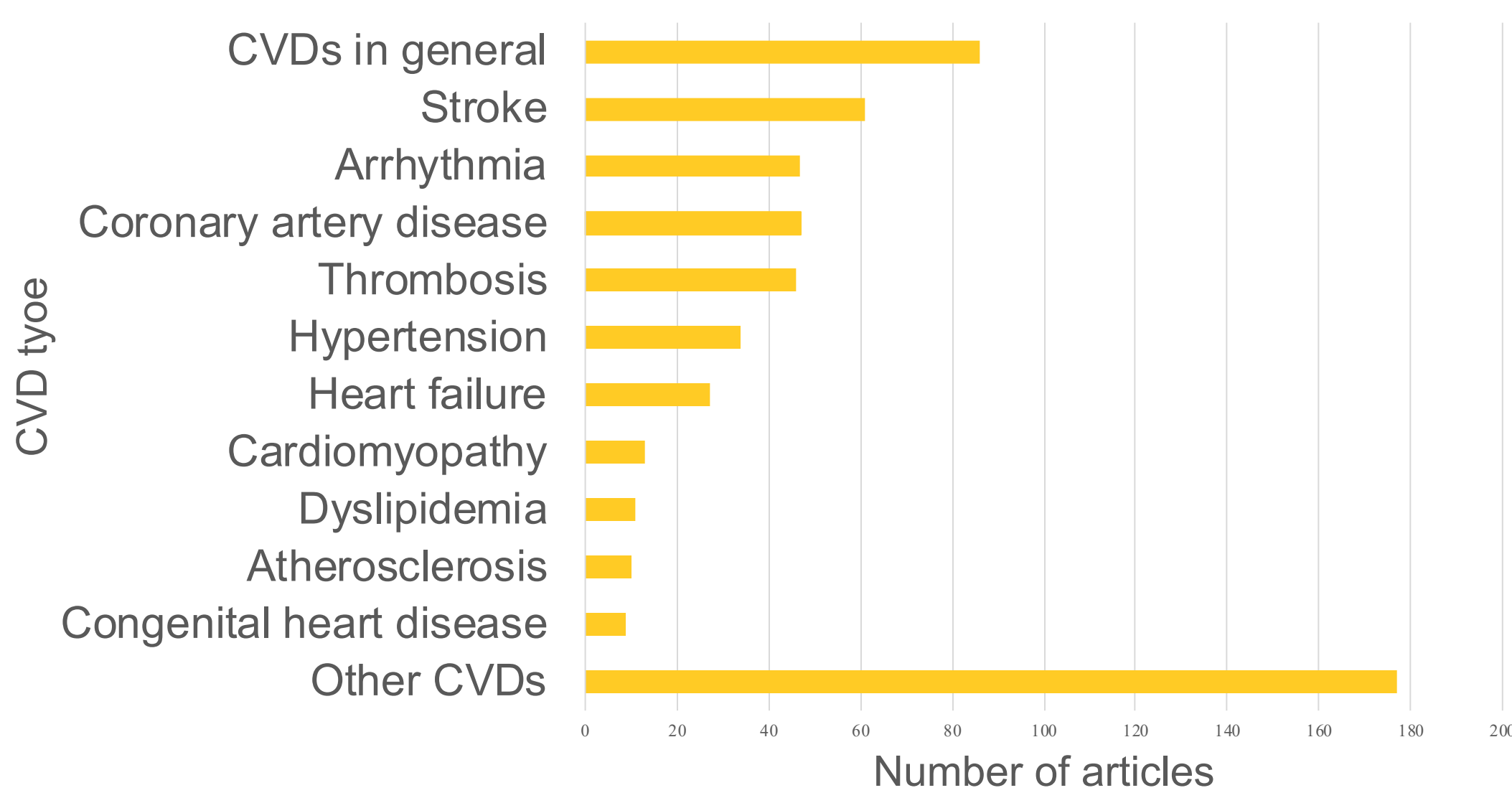
### Types of publication (Figure.2)

- 4 types identified: Original research articles, reviews, editorials, and letters
- The majority were **original articles**, followed by review articles



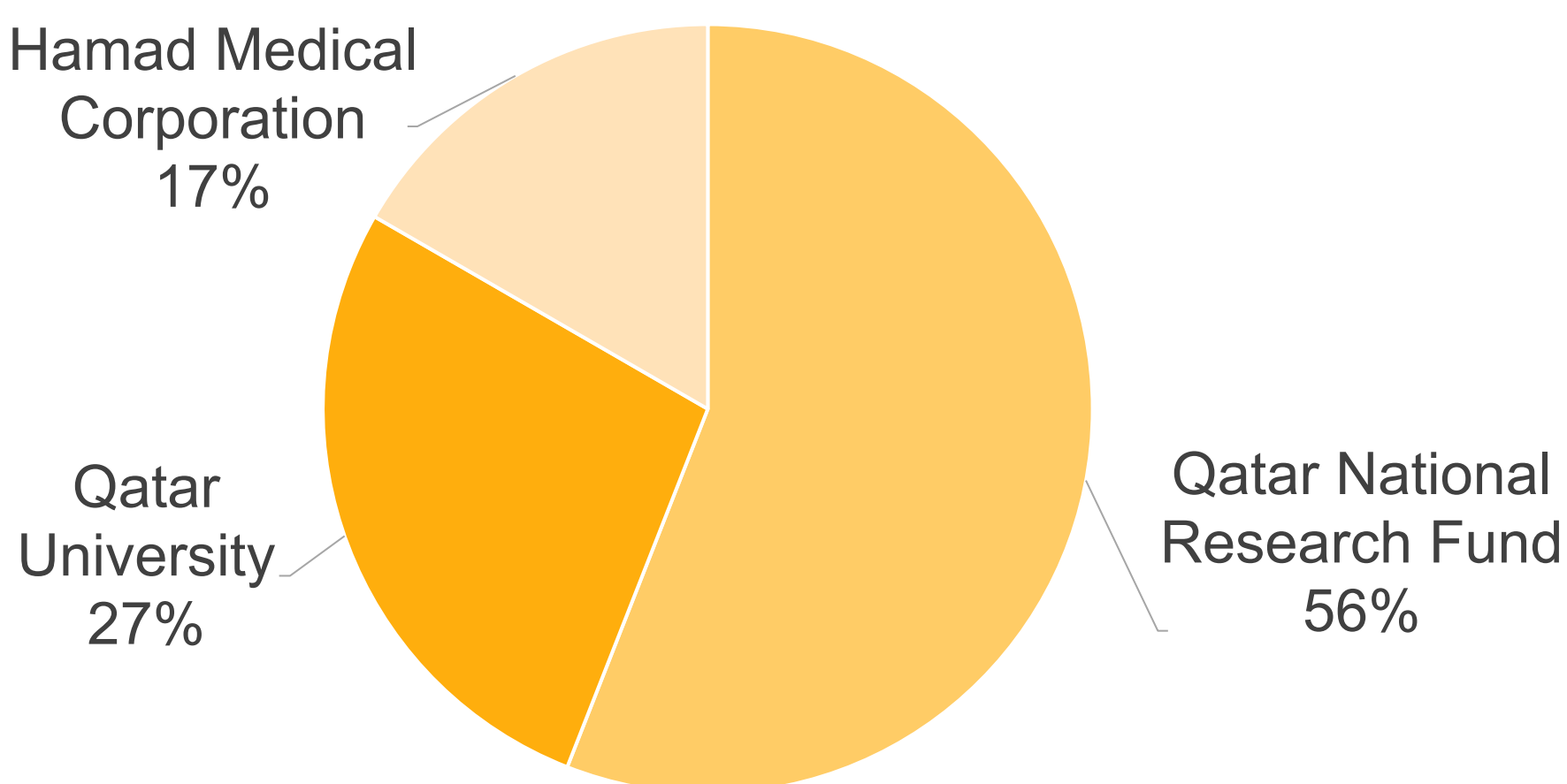
### CVD types (Figure.3)

- "**CVDs in general**" were the most common covered topic. It included disease burden, epidemiology, treatment approaches, and animal models.
- This was followed by **stroke**, arrhythmia, coronary artery disease, and thrombosis, respectively.



### Main funding institutions in Qatar (Figure. 4)

- 201 documents were funded
- 41.79% were funded by Qatari funding institutions.
- QNRF** was the main funding institution
- 44.5% had the main author from a Qatari affiliation, mainly **Hamad Medical Corporation**



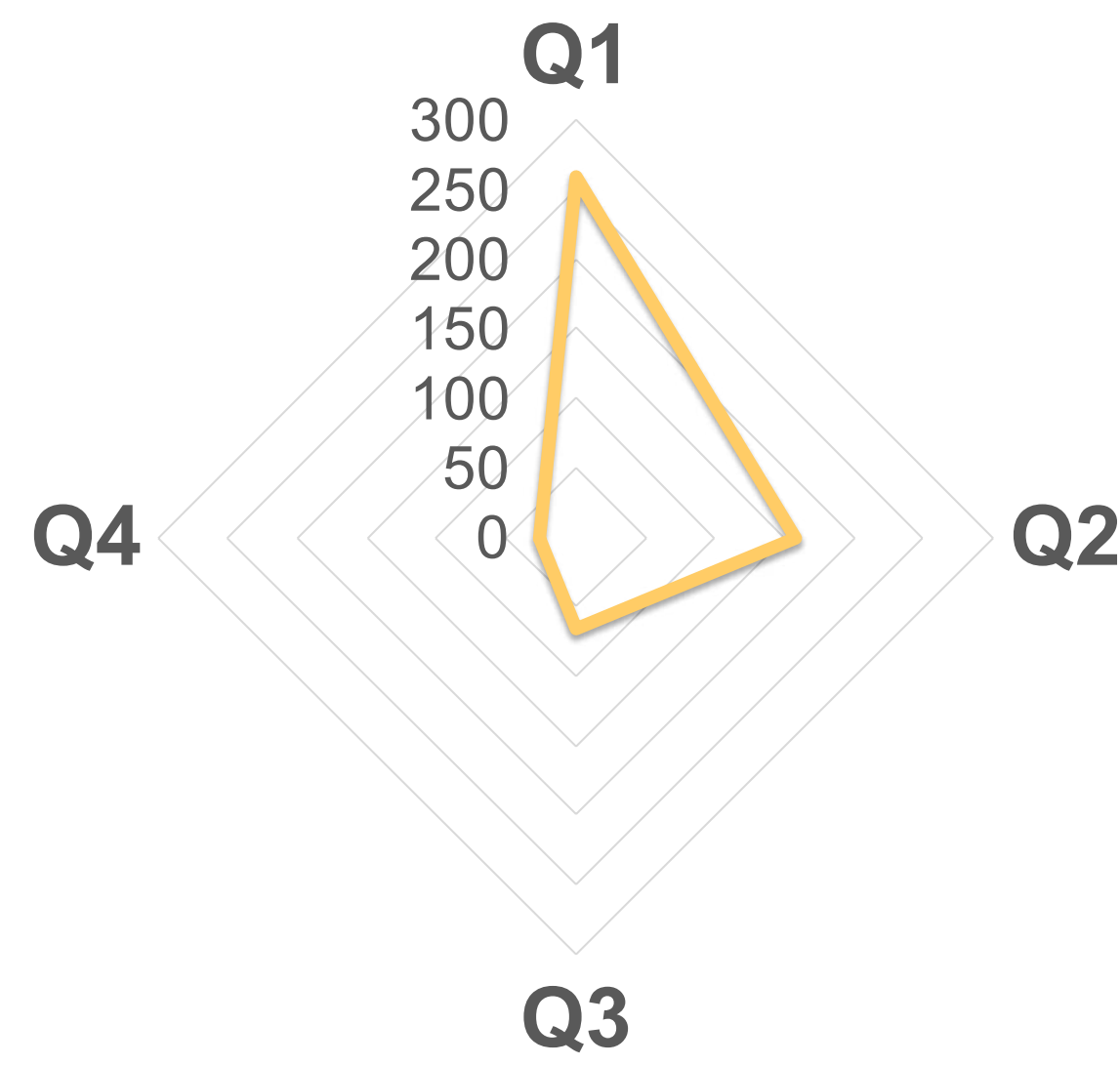
## Journal Related Parameters

### Journal metrics (Table. 2)

Metrics	Mean	Median	Minimum	Maximum
Impact Factor	4.17	3.04	0	48
H-index	101.54	68	0	1159
SJR	1.52	0.94	0.09	19.80
Citations	7.99	4	0	162

### Journal's quartiles (Figure. 5)

- 48% of the publications were published in the top 25% journals (Q1)
- 29.5% in Q2
- 4.8% of the publications were published in Q4



## Limitations

- Due to the limited time and large number of publications, only 3-year results were analyzed
- Although 4 databases were searched, some literature may have been missed such as grey literature

## Conclusion

- This study is an initial indicator that CVDs-related research in Qatar is of high quality
- This study will serve as a tool for funding institutions in the country for a better allocation of grants and funding
- Upon the completion of the study, we will be able to visualize more clearly and make a conclusion about CVD-related research in Qatar

**Acknowledgement:** We acknowledge with thanks the research grant provided by Qatar University [grant number: QUST-1-CPH-2021-1]

### References:

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# Examination of Job Satisfaction, Achievements, and Employment Preparedness among College of Pharmacy Alumni: A Study From Qatar

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Mohammad Diab<sup>1</sup>, Derek Stewart<sup>1</sup>, Sara Elshami<sup>1</sup>

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## Background

- Job satisfaction is known as the positive emotional state resulting from the appraisal of one’s job or job experiences.<sup>1</sup>
- Job satisfaction plays a major role in job commitment and performance.<sup>1</sup>
- Also, job satisfaction is affected by the level of educational preparedness and achievements in the workplace.
- To date, no study has been conducted in Qatar to measure the level of satisfaction with employment, preparedness and achievements among College of Pharmacy (CPH) at Qatar University (QU) graduates.

## Aim

To examine CPH-QU BSc graduate’s satisfaction with three aspects:



## Methods

- Study population: BSc graduates of CPH – QU.
- Ethical approval: QU Institutional Review Board (QU-IRB) (approval number QU-IRB 1187-EA/19).
- Design: Sequential exploratory mixed-method design <sup>2</sup> (Figure 1).

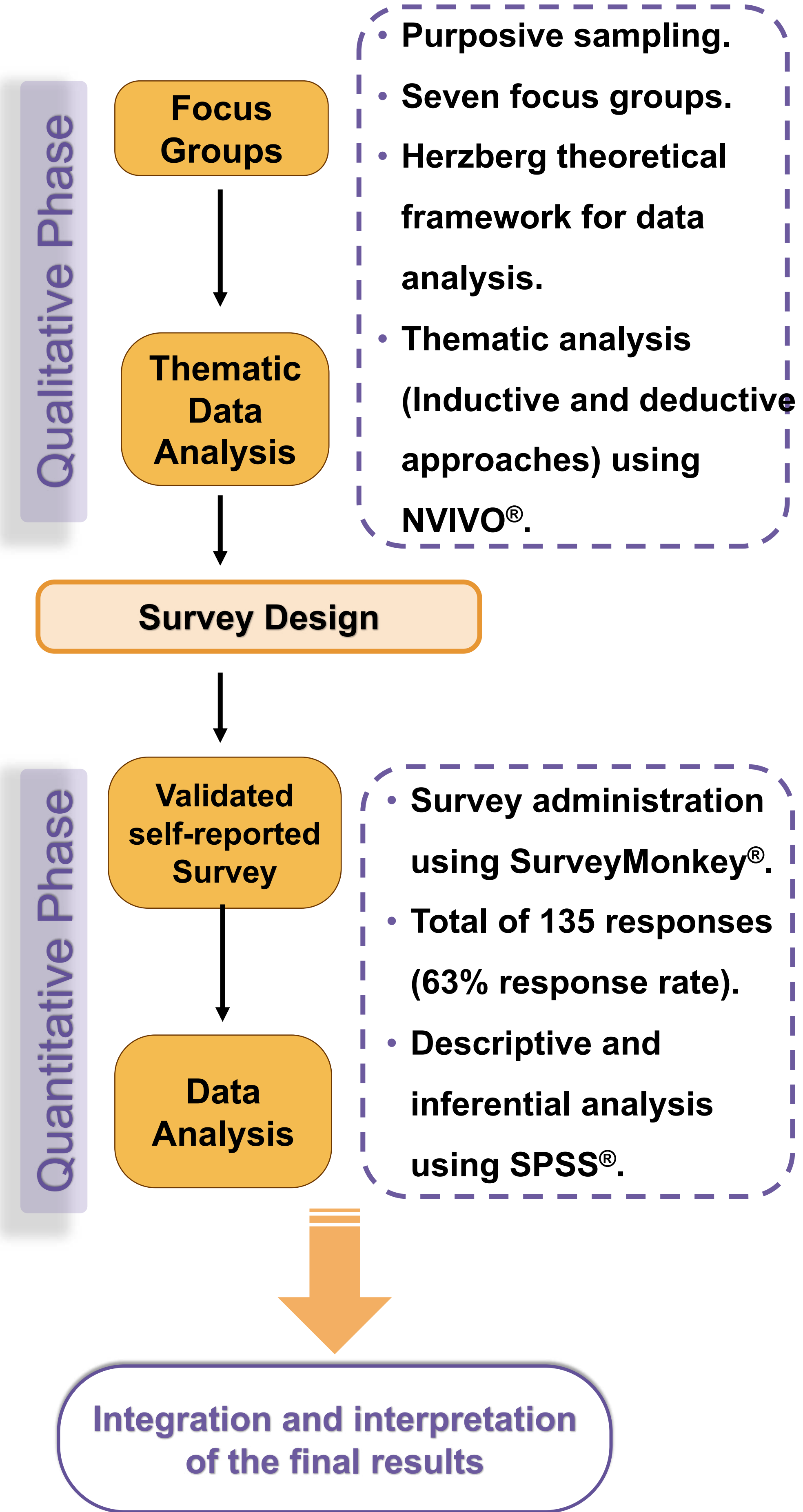


Figure1: Sequential exploratory mixed-method design

## Results

### I. Qualitative Phase:

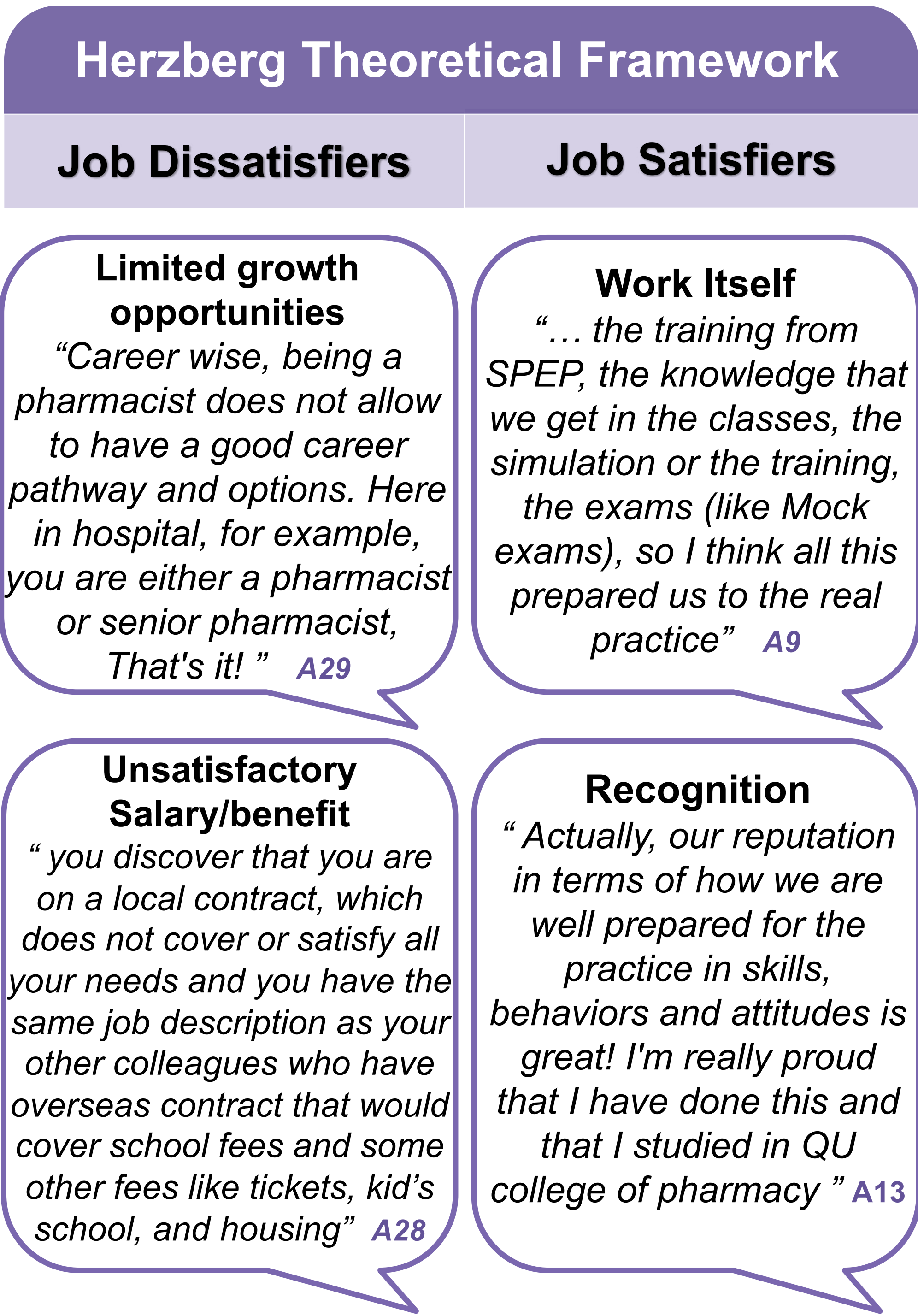


Figure2: Themes generated from the qualitative data

### II. Quantitative Phase:

Table (1): Satisfaction with employment and the profession:			
Item	Dissatisfied	Neutral	Satisfied
	n (%)	n (%)	n (%)
1. Salary/benefits offered by current place of employment	22 (22.5)	30 (30.6)	46 (47)
2. Workload in terms of number of hours/week	27 (27.5)	28 (28.6)	43 (44)
3. Professional relationships with co-workers	3 (3.1)	21 (21.4)	74 (75.5)
4. Social/family support	3 (3)	12 (12)	84 (85)
5. Opportunities for career growth	45 (44.6)	28 (27.7)	28 (27.7)

Table (2): Satisfaction with achievements in the workplace			
Item	Dissatisfied	Neutral	Satisfied
	n (%)	n (%)	n (%)
1. Developing a pharmacy-related service (new guideline/policy e.g.)	15 (14.02)	16 (14.95)	41 (38.32)
2. Being involved in a practice-related committee	9 (8.49)	17 (16.04)	28 (26.42)
3. Being involved in a national-level committee	12 (11.21)	20 (18.69)	12 (11.21)
4. Presenting a poster or an oral presentation at a professional conference	7 (6.61)	14 (13.21)	51 (48.12)

Table (3): level of educational preparedness to practice:

Item	Disagree	Neutral	Agree
	n (%)	n (%)	n (%)
1. The amount of content related to clinical pharmacy curriculum is adequate	21 (21%)	14 (14%)	67 (66%)
2. The amount of content related to pharmaceutical sciences is adequate	41 (40%)	22 (22%)	39 (38%)
3. The general science content of pre-admission to pharmacy is necessary for the remaining years in pharmacy program	23 (23%)	26 (26%)	53 (52%)
4. The degree to which undergraduate curriculum has relevance to the knowledge and skills required for current job	11 (11%)	20 (20%)	70 (69%)

## Conclusions and Recommendations

- The study findings suggested moderate satisfaction with employment, pharmacy profession, and achievements among alumni.
- A statistically significant higher values of satisfaction with employment was among Qatari alumni compared to non-Qataris.
- Year of graduation and monthly salary are the only influencing parameters for satisfaction with achievements in the workplace.
- Lack of professional growth is the main factor for job dissatisfaction among pharmacy alumni.
- Alumni believe they were well-prepared in terms of clinical skills and knowledge to join workplace.
- Alumni argued that more content related to pharmaceutical sciences is needed to meet the requirements of job market in Qatar.
- Future studies are needed to examine the influencing factors that affect alumni decisions in relation to post-graduate degrees and to examine CPH alumni’s conceptualization of preparedness to workplace.

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## Acknowledgments

- Qatar University internal grant QUST-1-CPH-2021-7.
- CPH-QU alumni who participated in this study.

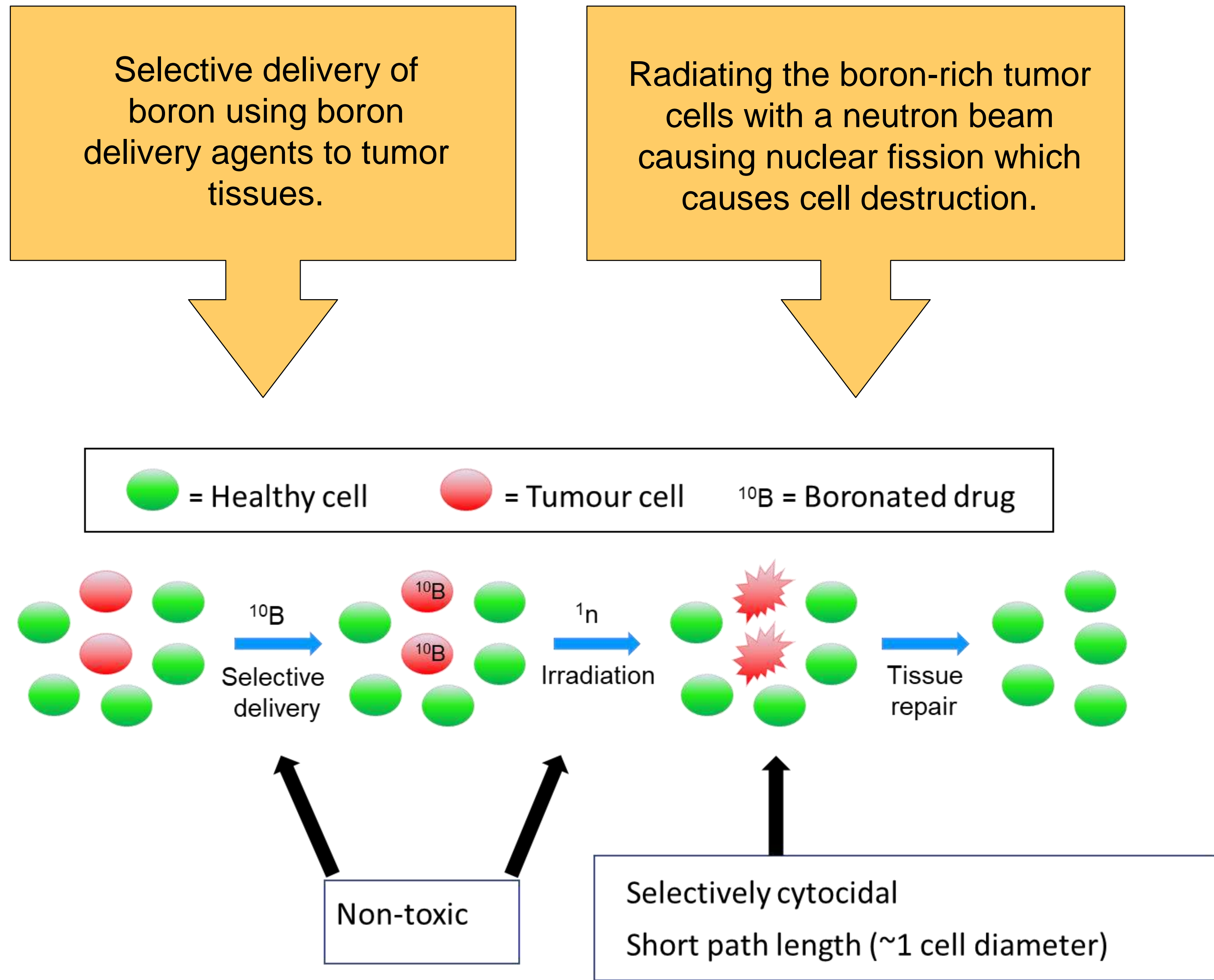


# Synthesis of boron derivatives for effective delivery of boron in neutron beam therapy for brain cancer: a systematic review

**Nada Issa<sup>1</sup>, Enge Sherif<sup>1</sup>, Dr. Anis Daou<sup>1</sup>, Dr. Nashiru Billa<sup>1</sup>**  
<sup>1</sup> Pharmacy Program, Qatar University (Current affiliations and those at time of study)

# Background

## What is Boron Neutron capture therapy (BNCT) ?



- Problem with current standard treatments like radiotherapy and chemotherapy is the lack of selectivity, the high risk of recurrence and a short median survival time of 14.6 months in brain cancer.
- To be able to perform a successful BNCT, effective boron delivery agents need to be identified, and for this, two molecules have been identified which are **BPA** and **BSH**.

## Objective:

The objective of this systematic review is to be able to search for and analyze clinical trials assessing the efficacy and safety of BNCT using BPA and BSH for treatment of brain cancer

## Methods:

<b>Databases used</b>	Embase      PubMed      Scopus*
<b>Keywords used</b>	BPA, BSH, “BNCT or Boron Neutron capture therapy”, “brain cancer” With appropriate Boolean operators
<b>Inclusion criteria</b>	<ul style="list-style-type: none"> <li>• efficacy and safety of BNCT technology using BPA or BSH molecules or both</li> <li>• BPA or BSH assessed against any standard intervention or nothing</li> <li>• Brain cancer patients only</li> </ul>
<b>Exclusion criteria</b>	<ul style="list-style-type: none"> <li>• Assessment of the efficacy of neutron beam <ul style="list-style-type: none"> <li>• Preclinical studies/phase 1 trials</li> <li>• Pharmacokinetics study</li> </ul> </li> <li>• Trials on any other type of cancer (ex: head and neck cancer or melanoma)</li> </ul>
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>• Median survival time</li> <li>• Tumor: normal tissue concentration of more than 3:1</li> <li>• Capability of crossing the blood brain barrier <ul style="list-style-type: none"> <li>• Blood boron concentration</li> </ul> </li> <li>• Any adverse reactions reported after boron neutron capture therapy.</li> </ul>
<b>Quality assessment</b>	Cochrane risk of bias assessment tool

## Results

- The search has resulted in 195 articles and ended with 27 results after excluding all irrelevant articles through title, abstract and full-text screening.
- But only 7 results are analyzed in the current time

**Three trials reported on the blood boron concentration :**

- 18 parts per million (ppm),
  - 17.4 µg/g
  - 24.7 µg/g

only **one trial** reported a mean tumor: tissue boron concentration to be equal to **3.7:1**

**Two trials tested BNCT using BPA and BSH against other interventions (radiotherapy and chemotherapy) with median survival time of:**

<b>BNCT using BPA and BSH</b>	<b>Standard treatment group</b>
<b>17.6 months</b>	<b>12.9 months for radiotherapy group</b>
<b>15.6 months</b>	<b>10.3 months for chemotherapy + radiation group</b>

**one trial** reported a median survival time of BNCT using BPA and BSH only (not against a comparator), which was **10.8 month**.

- There were no results regarding the blood brain barrier permeation
- There was also under-reporting and inadequate description of adverse drug reactions.

## Limitations:

- Incomplete analysis of all the 27 results, leading to inability to generate a comprehensive conclusion
- The included trials have poor quality (scoring high risk of bias in most of the domains)
- The trials don't have any form of statistical analysis confirming the significance of the results.

## Conclusion:

- BPA and BSH showed promising results in improving the median survival time.
- They have better selectivity compared to standard therapy; however, the best molecules have not been reached yet.

## Recommendations:

- New molecules such as Carboranes should be assessed in future studies for better selectivity to tumor cells.
- Blood brain barrier penetration is a challenge for the new molecules, and it should be considered.
- Adverse effects of the new molecules should be also considered.



# Two Decades of Oncology Research in Qatar Between 2001-2020: A Preliminary Bibliometric Analysis

Esraa Maklad<sup>1</sup>, Zeena Al-Mansouri<sup>1</sup>, Ahmed Awaisu<sup>2</sup>, Mohamed Izham Mohamed Ibrahim<sup>2</sup>

<sup>1</sup> College of Pharmacy, QU Health, Qatar University (P4 Students)

<sup>2</sup> College of Pharmacy, QU Health, Qatar University (Supervisors)

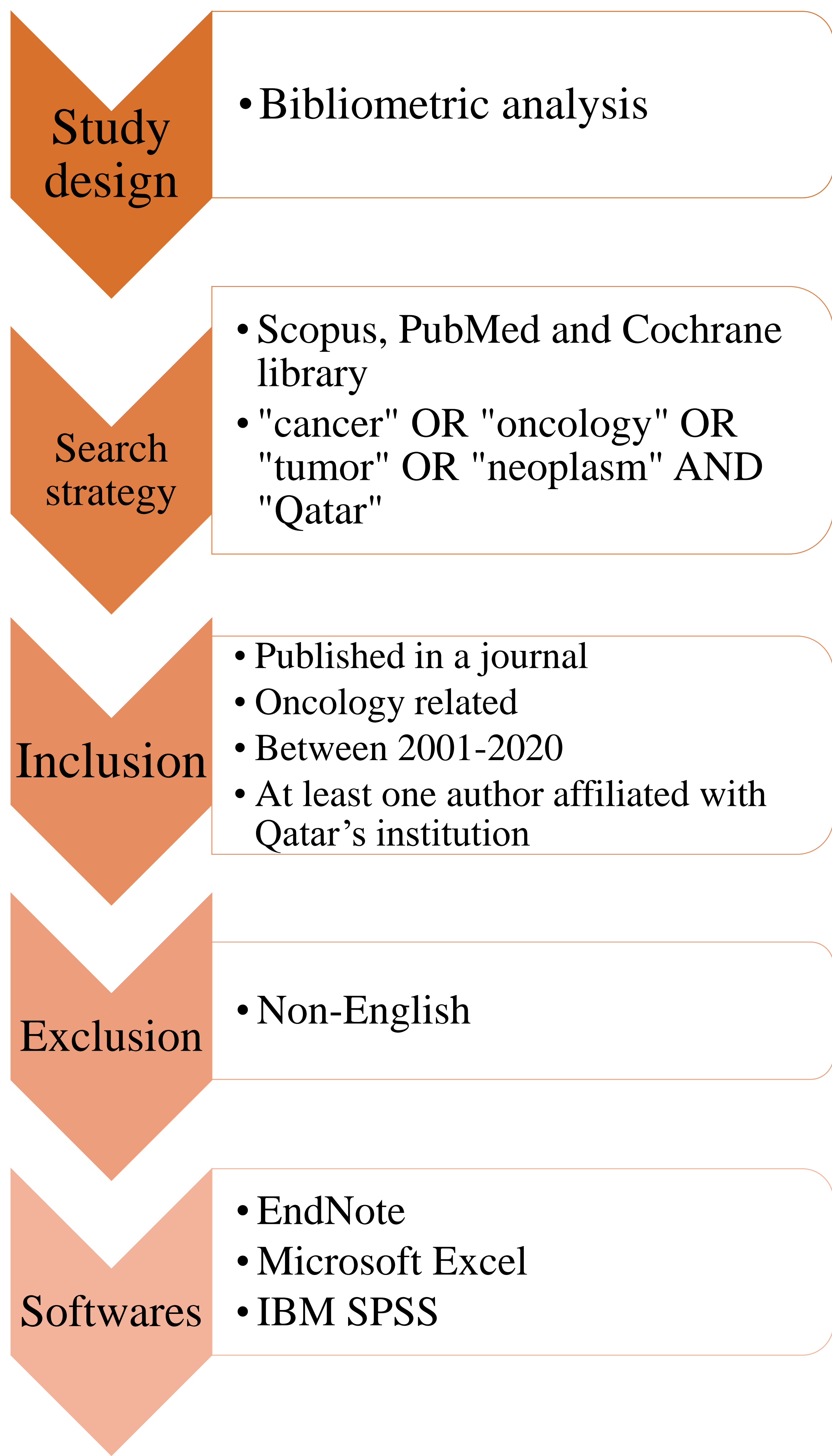
## Background

- Cancer is one out of four priority research areas in Qatar.
- With extensive funding provided by the country, a striking rise in research is anticipated.
- However, the unknown status of neoplastic research warrants the need for cancer activity mapping.

## Objectives

- To analyze the quality and quantity of oncology literature in Qatar through bibliometric analysis.
- To evaluate the synchronization of current research performance with the research roadmap planned.

## Methodology



## Results

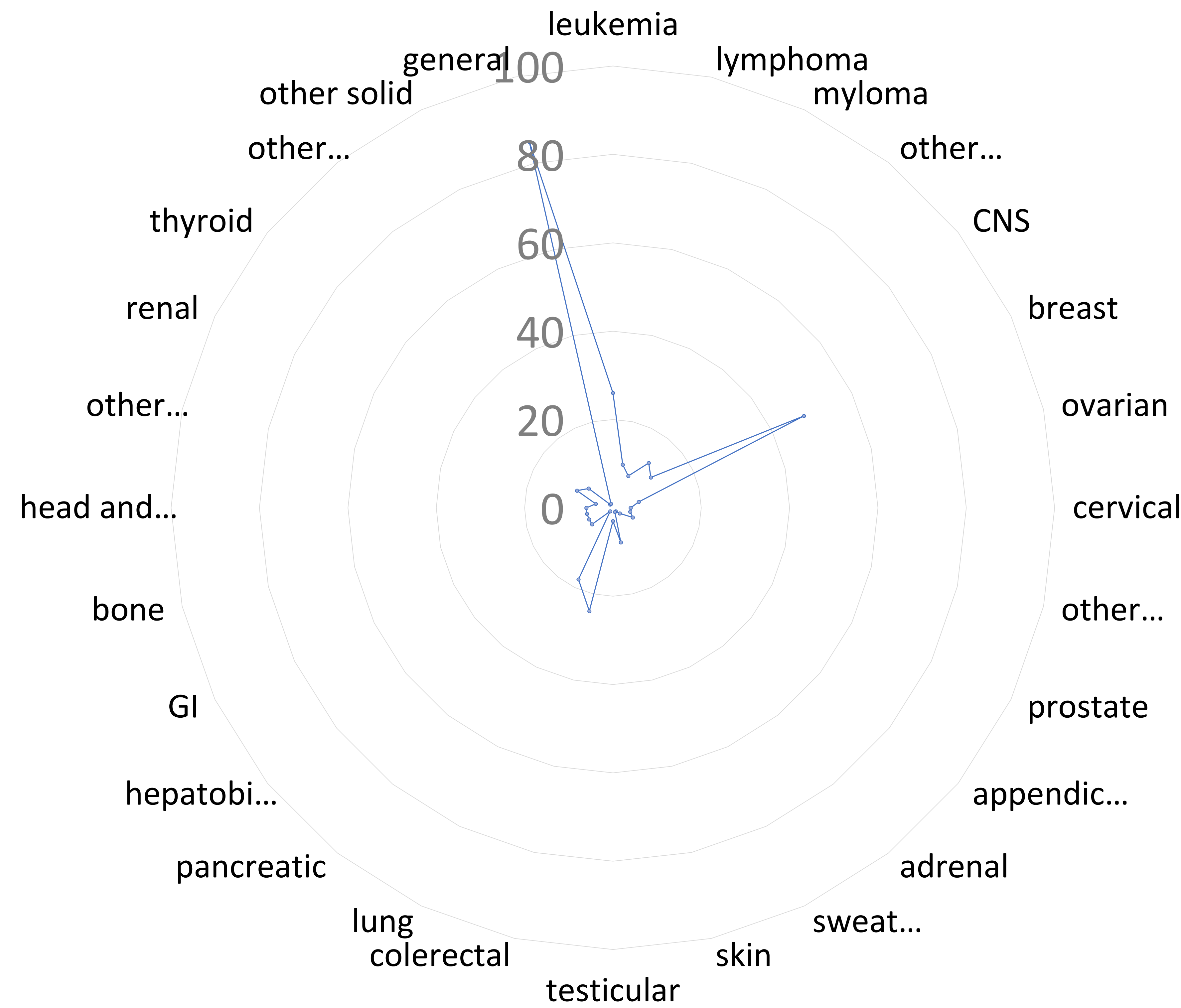


Figure 1: The Most Frequent Type of Cancer Research Articles Published in 2020

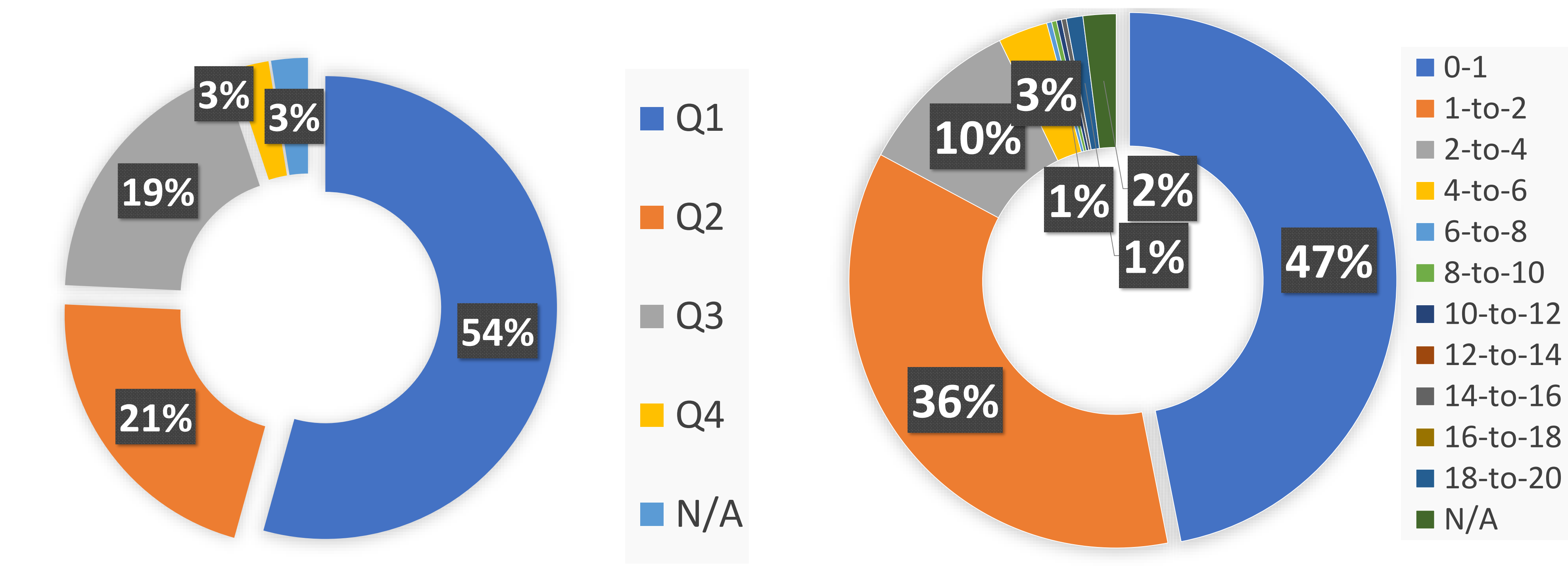


Figure 2: Quartiles Ranking of Journals

Figure 3: SCImago Journal Rank

## Conclusions

- Researchers in Qatar have contributed to 314 cancer-related articles in 2020 mostly published within high-moderate quality journals.
- Researchers from Qatar have shown significant awareness regarding cancer research and which type of cancer is a high priority in Qatar.
- QU, QF, and HMC were the leading players in the local research funding.
- Upon completing this study, comprehensive insight on cancer activity research in Qatar during the last 20 years is to be provided.



# Efficacy and Safety Outcomes Among High Intensity Statins - A Systematic Literature Review -

Hend Al-Naimi, Moumena Haddad, Myriam Eljaam, Daoud Al-Badriyeh  
College of Pharmacy, QU Health, Qatar University, Doha, Qatar

## Background

- Statins are first-line agents against hypercholesteremia
- Several literature head-to-head studies compare **high-intensity statins** with respect to different outcomes
- No summative reviews exist in the literature for how different **high-intensity statins** compare

## Study Objective Methods

Qualitative summary of literature evidence about the relative efficacy and safety outcomes among **high-intensity statins**, i.e. atorvastatin (ATV), rosuvastatin (RSV), vs. simvastatin (SMV)

## Methods

Design	Systematic review of literature
Databases and grey literature	<ul style="list-style-type: none"><li>PubMed, Embase, and Cochrane Central</li><li>ClinicalTrials.Gov and Google scholar</li></ul>
Search terms	Domains: <b>drug</b> (e.g. atorvastatin, rosuvastatin, simvastatin), <b>dose</b> (e.g. atorvastatin 80mg, rosuvastatin 40mg) and <b>high-intensity</b> (e.g. high potency, high strength)
Inclusion	Full text, English, human-based, comparative studies
Study selection	Screening title/abstract, and then full text
Quality assessment	Crowe Critical Appraisal Tool (CCAT)
Data extraction	In duplicate by two reviewers

## Results

- Out of 2,128 found articles, 35 articles are eligible for analysis
- \*\*\* This current research is a partial analysis, only including the observational studies, i.e. 7 studies

### Quality assessment results

Study	Total
Choi et al. (2021)	83%
Rahhal et al. (2020)	92%
Roy et al. (2020)	80%
Lewis et al. (2018)	63%
Betto et al. (2017)	70%
Meek et al. (2011)	78%
López-Cuenca et al. (2008)	48%

## Results...continued

### Characteristics of included studies

Study	Year	Country	Sample size	Outcome		
				Clinical	Surrogate	Safety
Choi et al.	2021	Korea	2221	✓		
Rahhal et al.	2020	Qatar	626	✓	✓	✓
Roy et al.	2020	India	942	✓	✓	✓
Lewis et al.	2018	USA	136		✓	
Betto et al.	2017	Lebanon	313		✓	✓
Meek et al.	2011	UK	166		✓	✓
López-Cuenca et al.	2008	Spain	49		✓	

### Safety outcomes

Hepatic dysfunction (n=3)	No significant difference between: <ul style="list-style-type: none"><li>ATV 80 mg vs. 40mg</li><li>RSV 20mg vs. 40mg</li><li>ATV 80mg vs. RSV 40mg</li></ul>
Muscle related adverse events, e.g. myopathy, creatinine phosphokinase (n=3)	No significant difference between: <ul style="list-style-type: none"><li>ATV 80mg vs. 40mg</li><li>RSV 40mg vs. RSV 20mg</li><li>ATV 80mg vs. RSV 40mg</li></ul>
Renal dysfunction (n=1)	No significant difference in serum creatinine level between RSV 40mg and 20mg
Discontinuation of therapy and intolerance (n=3)	No significant difference between:(n=2) <ul style="list-style-type: none"><li>ATV 80mg vs. ATV 40mg</li><li>ATV 80mg vs. RSV 40mg</li></ul> Significant difference between:(n=2) <ul style="list-style-type: none"><li>Discontinuation: SMV 80mg vs ATV 80mg; toward SMV 80mg</li><li>Gastritis/gastroesophageal reflux: RVS 40mg vs ATV 80mg; toward RSV 40mg</li></ul>

### Efficacy outcomes

Main cardiovascular outcomes such as: (n=3) <ul style="list-style-type: none"><li>Myocardial infarction</li><li>Fatal/non-fatal stroke</li><li>Death</li></ul>		No significant difference between: <ul style="list-style-type: none"><li>ATV 40-80mg vs. RSV 20mg</li><li>ATV 40mg vs. 80mg</li><li>ATV 80mg vs. RSV 40mg</li></ul>
Surrogate outcomes (n=6)	Low density lipoprotein-cholesterol (LDL-C)	Significant difference between: <ul style="list-style-type: none"><li>ATV 40mg vs. 80mg; favoring ATV 80mg</li><li>ATV 40-80 vs. RSV 20-40mg; favoring RSV</li><li>ATV 80mg vs. SMV 80mg; favoring ATV</li></ul>
	C-reactive protein	Significant difference between: <ul style="list-style-type: none"><li>ATV 40mg vs. 80mg; favoring ATV 80mg</li><li>RSV 40mg vs. ATV 80mg; favoring ATV 80mg</li></ul>

## Limitations

- Different search strings may identify additional relevant studies
- Language-restricted search might have missed relevant non-English studies

## Conclusions

- Main cardiovascular outcomes did not differ among the **high-intensity statins**
- LDL-C:**
  - Dose dependent effect with ATV doses
  - RSV showed more reduction when compared with ATV
- RSV 80mg had more anti-inflammatory effect when compared to ATV 40mg and RSV 40mg
- Studied statins were well tolerated and had comparable safety profile
- These results are partial, and did not include the clinical trial studies
- Future work:** meta-analysis that would provide quantitative, higher level of evidence





# Design and synthesis of novel mono-carbonyl curcumin analogs as potential treatment for triple negative breast cancer

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## Background

- Breast cancer is highly prevalent in Qatar, accounting for 38.7% new cases in females annually in which ~20% are TNBC.
- This cancer is heterogeneous with numerous subtypes, and with no FDA targeted therapies.
- Curcumin has anticancer activity against various tumors in colon, duodenum, esophagus, stomach, breast, and prostate.
- However, it has poor physiochemical properties.
- Modification of the structure could improve the anticancer activity.
- By substituting the highly reactive di-ketone moiety with a mono-carbonyl group along with adding hetero-aromatic rings.

## Objectives

- Synthesize, purify and characterize the structure of novel mono-carbonyl curcumin-based analogs.
- Screen the new compounds against TNBC cell lines.

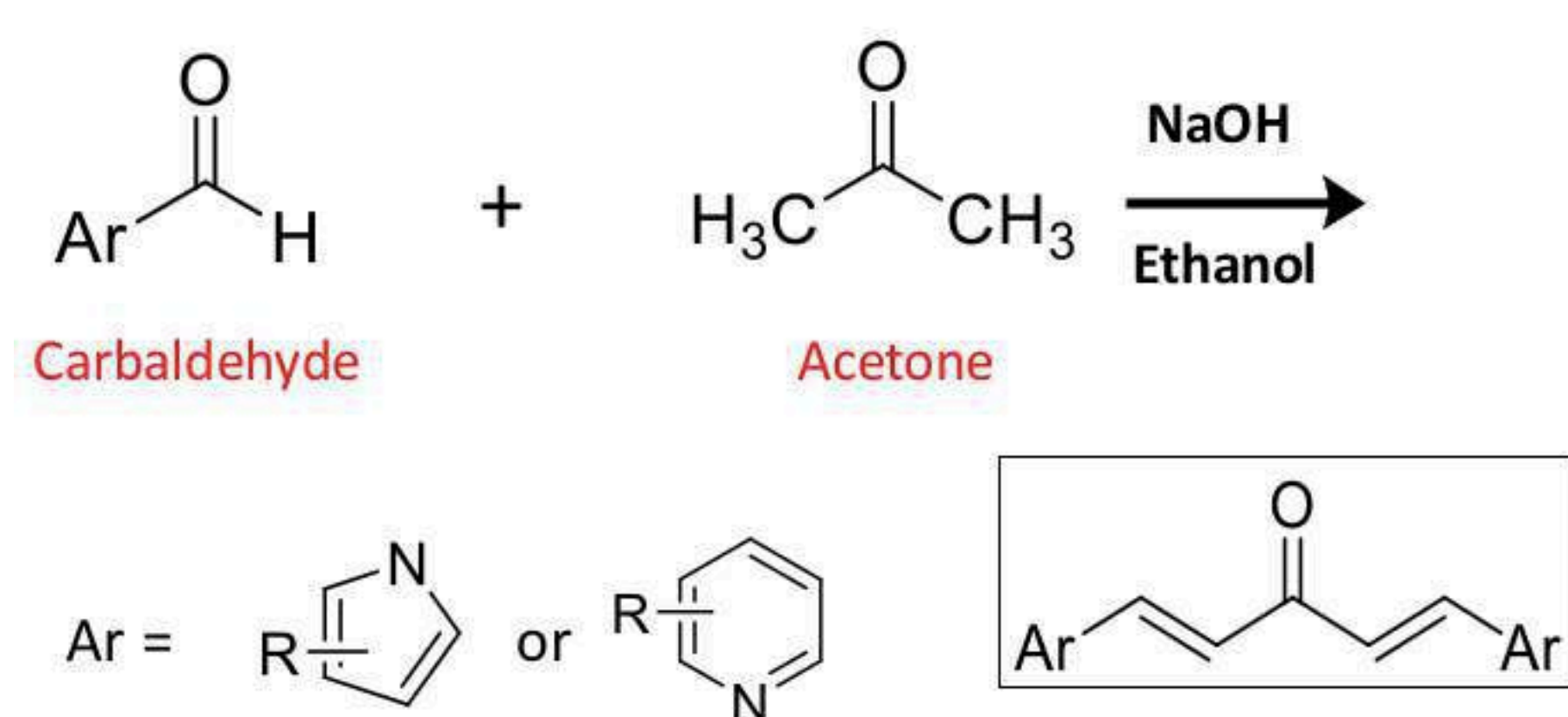
## Method

### Literature Review:

- SciFinder was used to ensure that the proposed compounds are novel.

### Synthesis:

- Mono-carbonyl curcumin analogs were synthesized using Claisen Schmidt condensation reaction.
- 1mmol of acetone were reacted with 2mmol of aryl carbaldehyde in the presence of NaOH and ethanol, are left overnight at room temperature (Figure 1).



**Scheme 1: Synthetic approach of mono-carbonyl curcumin analogs**

### Purification:

- TLC, liquid-liquid extraction, and flash column chromatography were done to purify the compounds.

### Structure elucidation:

- FTIR and NMR were performed.

### Biological screening:

#### Cell viability:

- MDA-231 and MDA-436 cell lines were seeded at a density of 8000 cell/well and left for 24 hours in 96-well plates.
- Concentrations of BC2 and curcumin ranging between 5 - 60  $\mu\text{M}$  were added.
- At 48 hours post treatment, 100  $\mu\text{L}$  of 1:10 alamarBlue solution was added to each well.

#### Cell morphology:

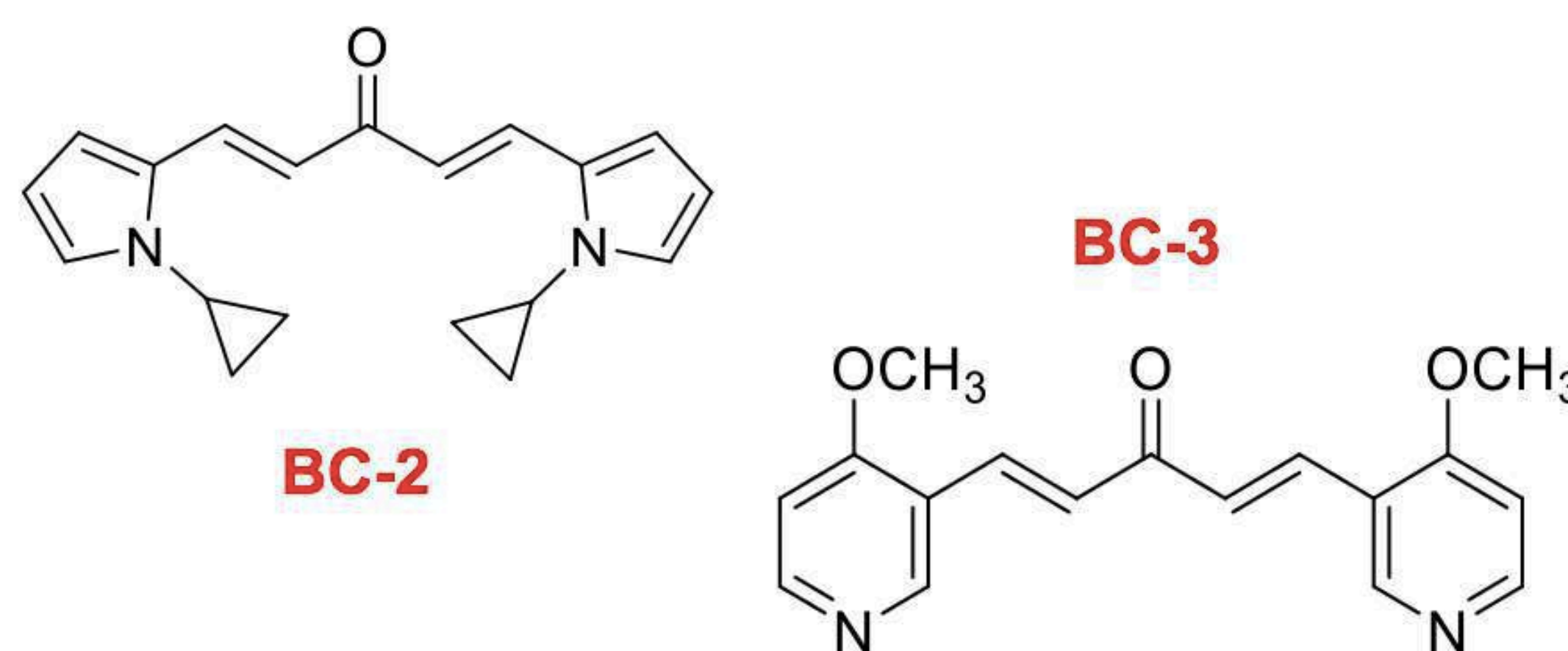
- Microscopic changes of cell differentiation, and size were observed at 24 & 48 hours.

## Results

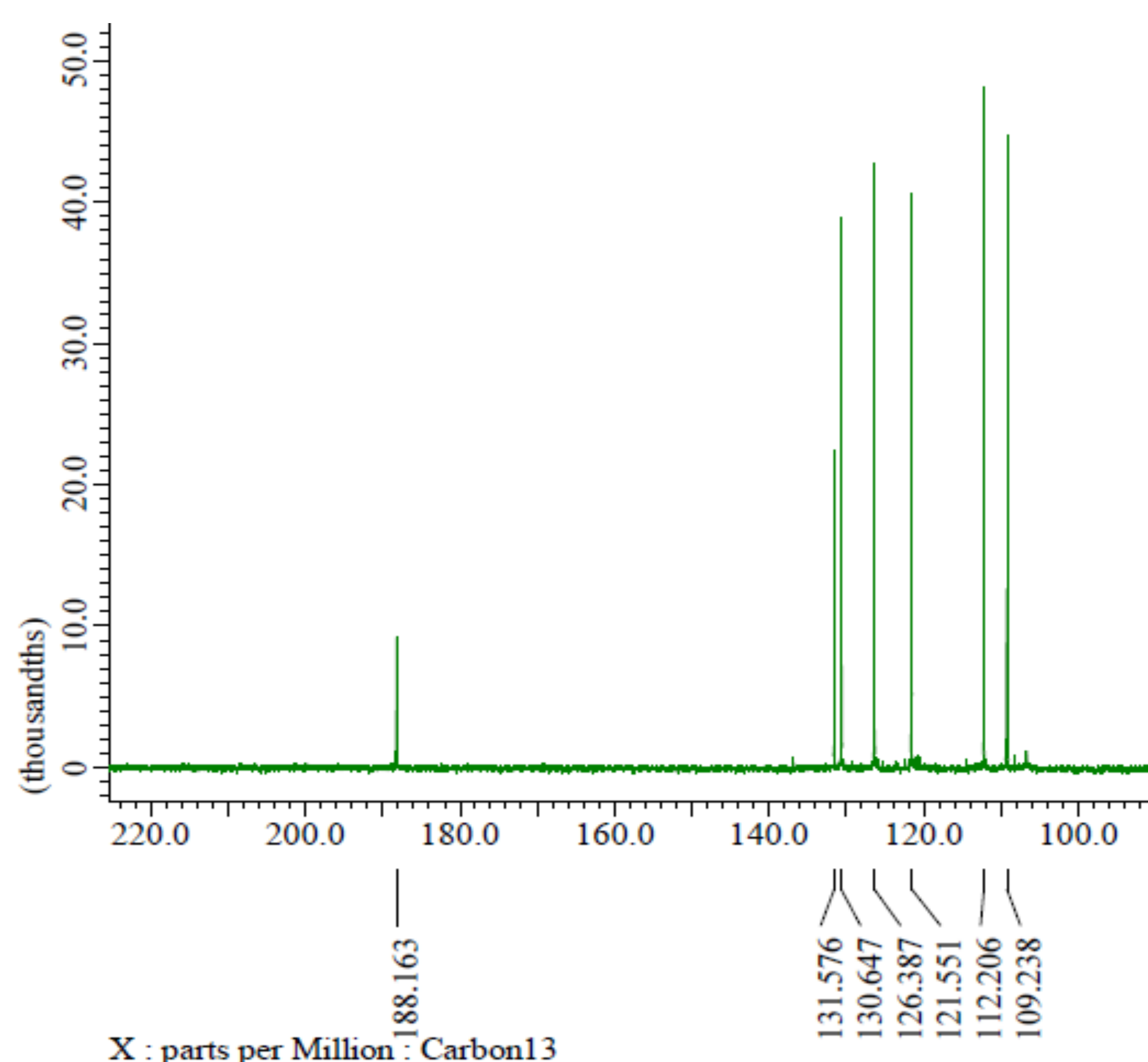
- Two compounds were synthesized. Their structure are labeled as BC-2 & BC-3 (Figure 1).

### NMR results:

- The obtained NMR spectroscopic analysis of  $^1\text{H}$  and  $^{13}\text{C}$  proves the right structure of BC2 compound, which aids in confirmation of the compound (Figure 2)



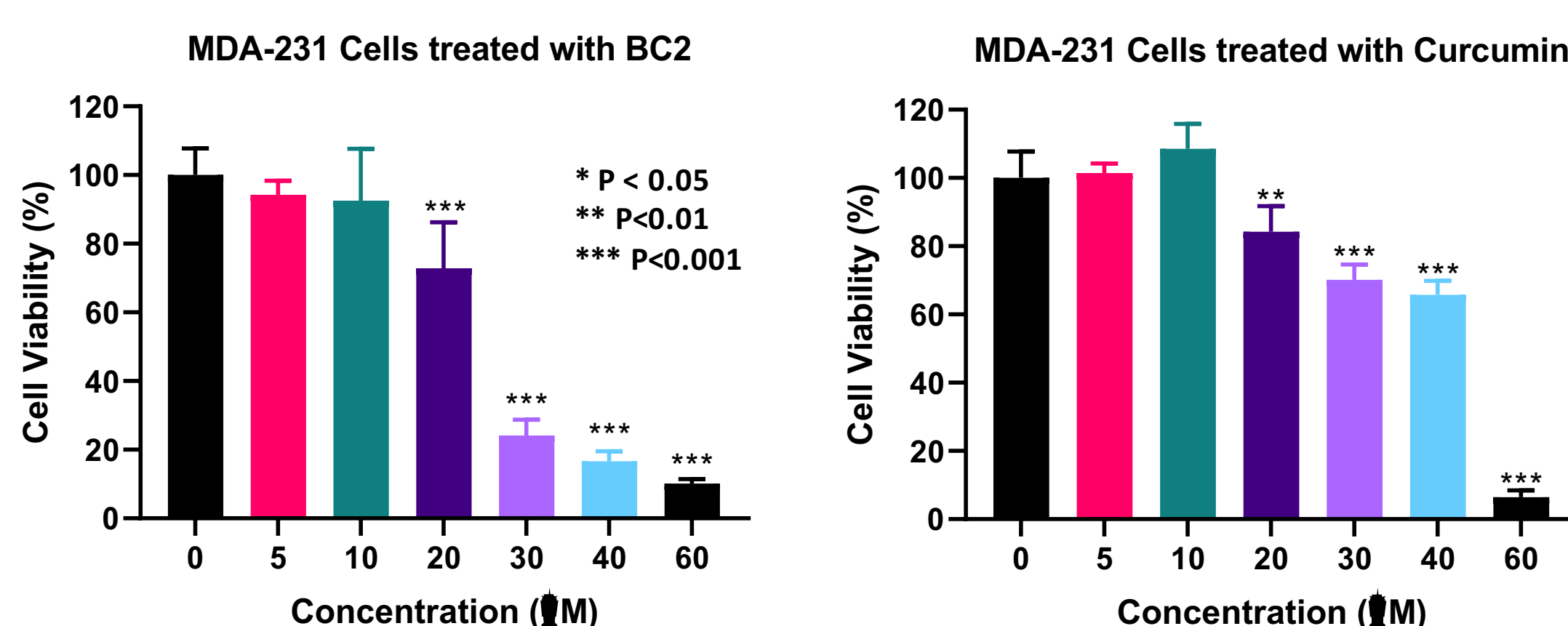
**Figure 1: Synthesized compounds chemical structures**



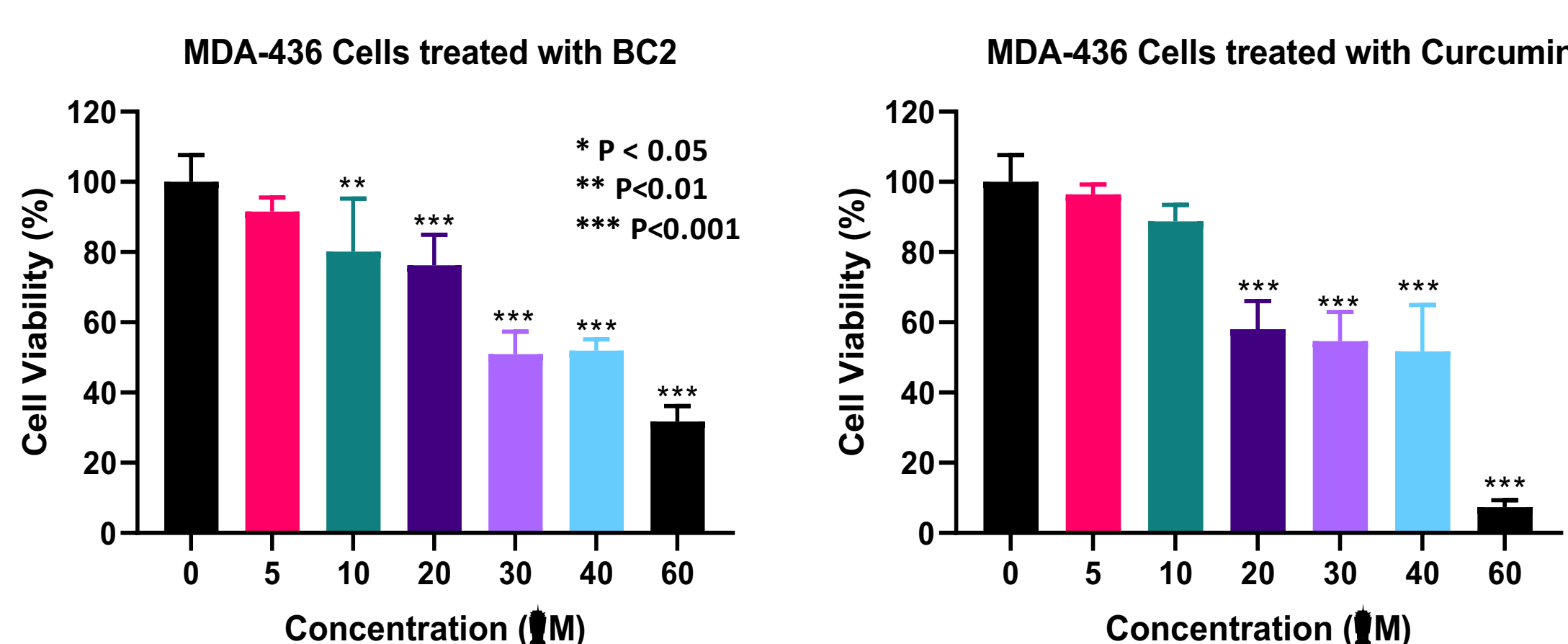
**Figure 2:  $^{13}\text{C}$ -NMR spectra of compound BC2**

### Cell viability results:

- BC2 reduced the viability of MDA-231 and MDA-436 at dose-dependent manner (Figure 3&4).
- It started to significantly ( $P < 0.001$ ) reducing the viability of MDA-231 and MDA-436 at concentrations of 20  $\mu\text{M}$  and 10  $\mu\text{M}$  respectively against DMSO after 48 hours of treatment.
- It, also had significantly ( $P < 0.001$ ) higher reduction of MDA-MB-231 cell lines than curcumin by 45% and 49% at concentrations of 30 and 40  $\mu\text{M}$  respectively.



**Figure 3: Effect of compound BC2 on metabolic activity of MDA-231 cell line after 48 hours of treatment**

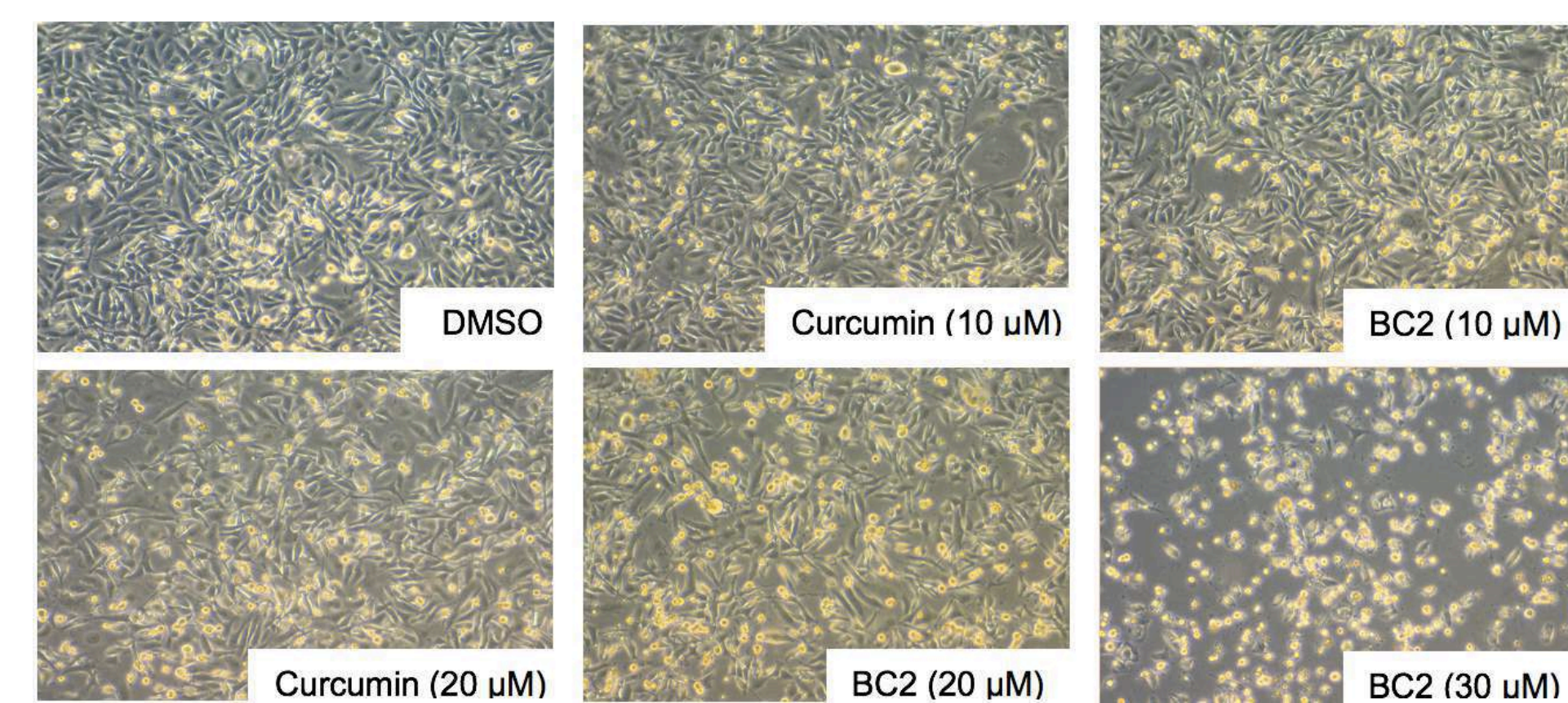


**Figure 4: Effect of compound BC2 on metabolic activity of MDA-436 cell line after 48 hours of treatment**

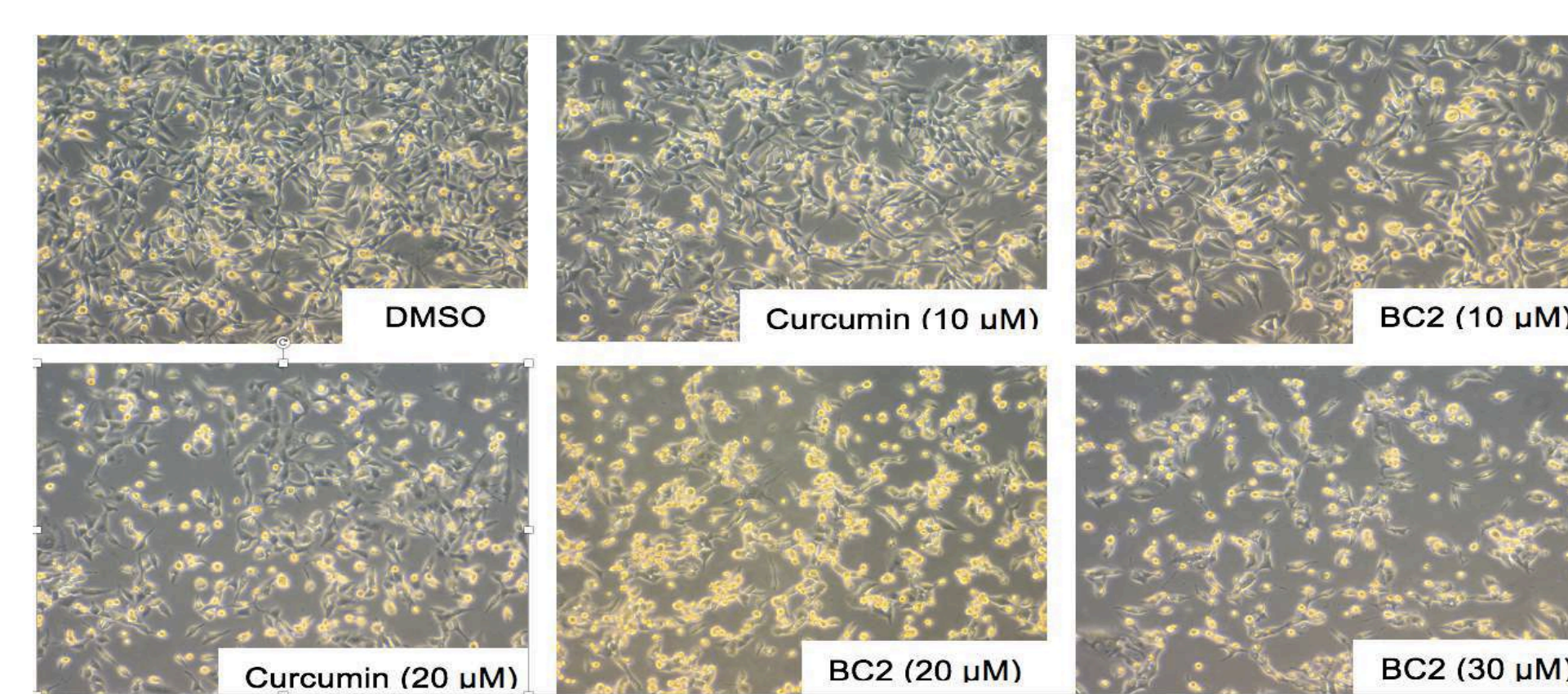
## Results ... continued

### Cell morphology results:

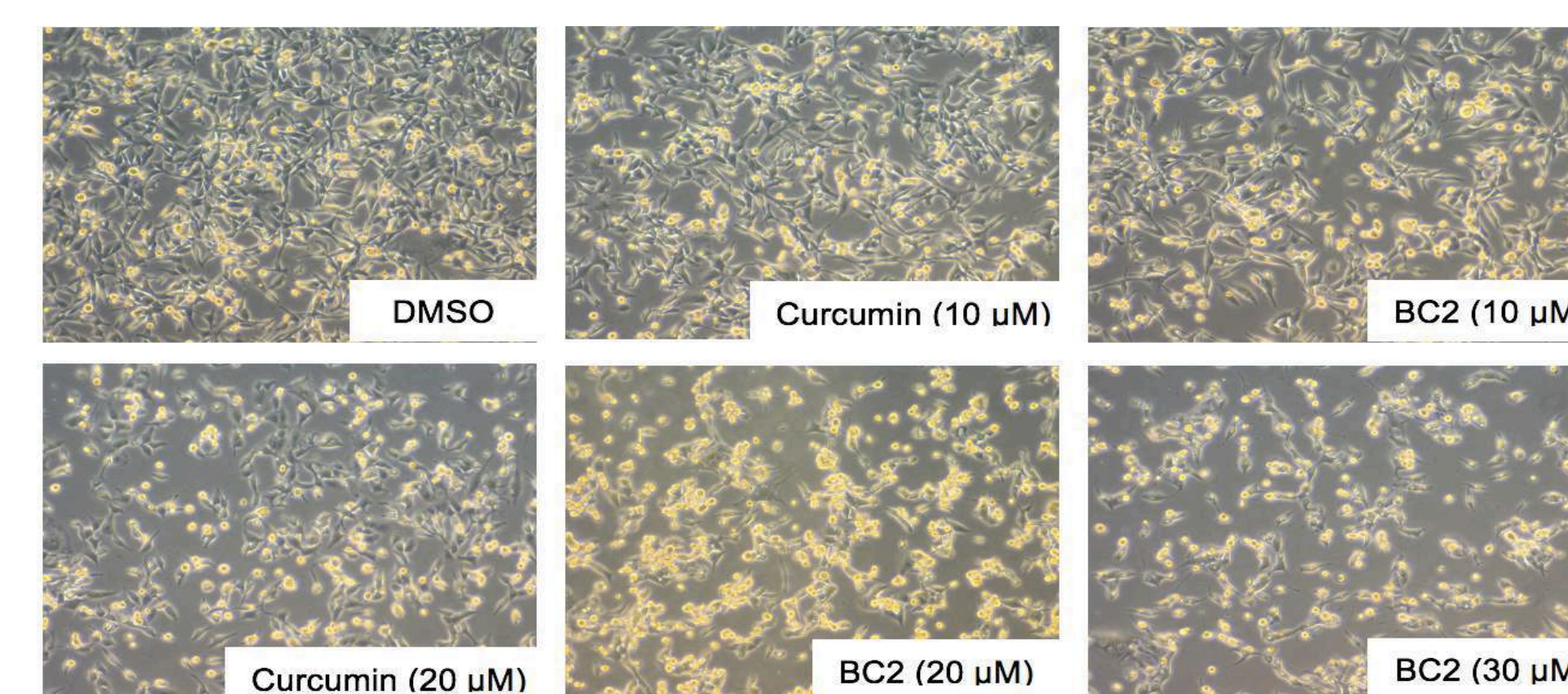
- BC2 at a concentration of 30  $\mu\text{M}$  showed higher reduction of cell proliferation, increase in floating cells, and cell death compared to DMSO after both 24 and 48 hours. (Figure 5-8).



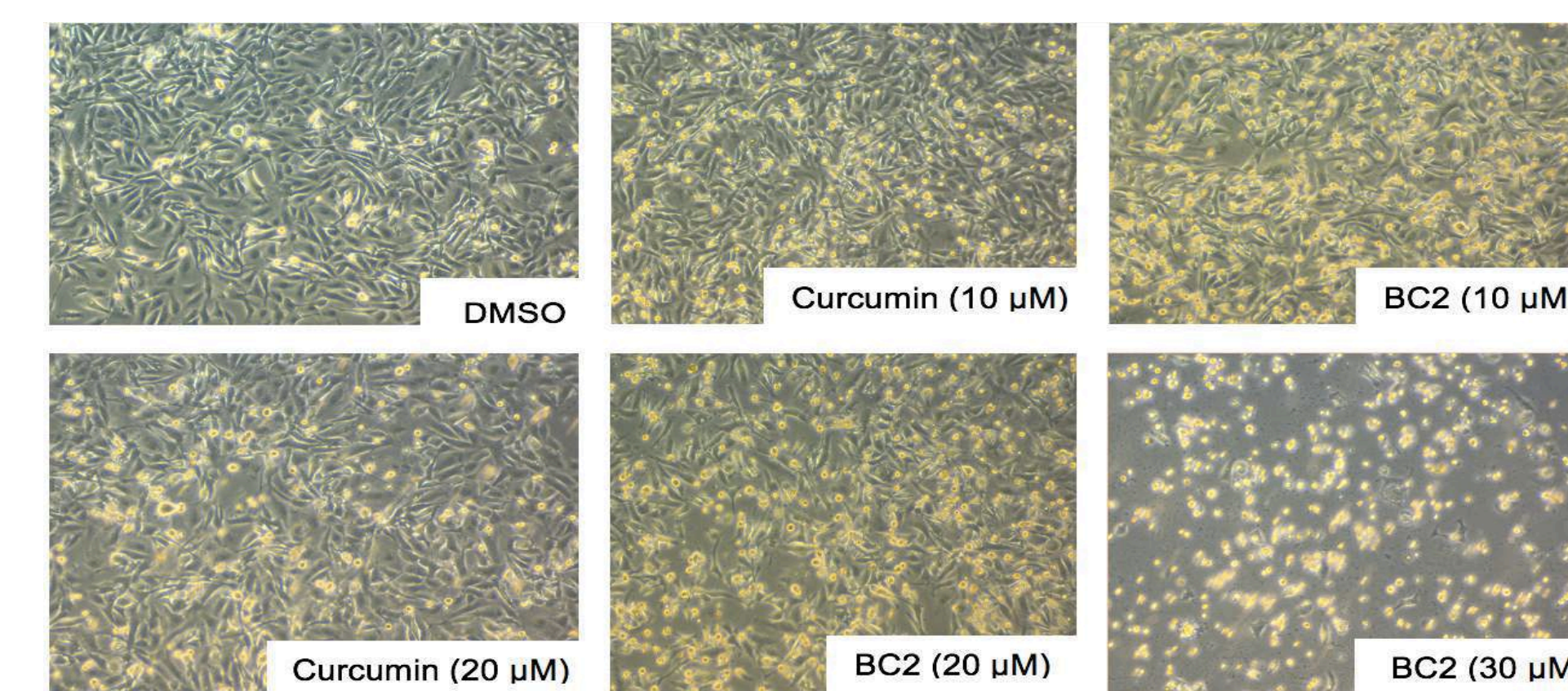
**Figure 5: MDA-231 cell morphology at 24 h**



**Figure 6: MDA-436 cell morphology at 24 h**



**Figure 7: MDA-231 cell morphology at 48 h**



**Figure 8: MDA-436 cell morphology at 48 h**

## Conclusion

- Mono-carbonyl curcumin analogs. were synthesized using Claisen Schmidt condensation.
- BC2 showed higher reduction of MDA-231 by ~ 50% compared to curcumin after 48 h.
- BC2 could be considered a potential lead compound for the treatment of TNBC, requiring further analysis to be carried out.

## Future Direction:

- Running 2D NMR analysis for full elucidation and final confirmation of BC2 structure.
- Synthesizing more derivatives of mono-carbonyl curcumin analogues to optimize structure activity relationship and to explore their anticancer activity.
- Continue running analytical and biological screening for BC3 compound.

## Acknowledgment

- This project is financially supported by QUST-1-CPH-2021-3 and QUCG-CPH-20/21-4 grants from Qatar University. Thanks to Ms. Ola Hussein for providing technical and teaching assistance.



# Exploring QU health students’ behavioral determinants, perspectives, and experiences toward student leadership

## A quantitative study

Menatallah Rayan<sup>1</sup>, Dhabya Al-Khater<sup>1</sup>, Myriam ElJaam<sup>1</sup>, Mohammed Diab<sup>1</sup>, Derek Stewart<sup>2</sup>, Dr. Alla El-Awaisi<sup>1\*</sup>  
<sup>1</sup>College of Pharmacy, Qatar University, <sup>2</sup>QU Health, Qatar University, Qatar. \*Principal Investigator

### Background

- Leadership is the ability to motivate a group of people to work together towards a common goal to meet the needs of an organization
- Leaders in society are viewed as agents of change
- Many international bodies recommend that leadership development should be incorporated in healthcare students’ education
- Student organizations are important avenues for leadership development
- Qatar University’s Strategy 2018-2022 stresses on graduate excellence, and aims to prepare graduates who are well-rounded, with qualities and principles that maximize their impact

### Study Objective

- The objectives of this study were to explore the perspectives of QU Health students towards student leadership in terms of the following:
- Behavioral determinants influencing involvement in student leadership
  - The qualities of successful student leaders
  - The required support and training for student leaders

### Methods

Design	<div><ul style="list-style-type: none"><li>Quantitative methodology</li><li>Cross-sectional, web-based, survey</li></ul></div>
Setting & Participants	<div><ul style="list-style-type: none"><li>All 1352 Qatar University Health Students (Pharmacy, Medicine, Health Sciences, Dental Medicine)</li></ul></div>
Data collection	<div><ul style="list-style-type: none"><li>Survey contained five sections consisting of items derived from the 14 domains of the Theoretical Domains Framework (TDF)<sup>[1]</sup> and items partially adapted from the National Student Leadership Survey<sup>[2]</sup></li></ul></div>
Data Analysis	<div><ul style="list-style-type: none"><li>Descriptive statistics using IBM SPSS® v27</li><li>Inductive content analysis of open-ended questions</li><li>Cronbach’s alpha for internal consistency</li></ul></div>
Ethics Approval	<div><ul style="list-style-type: none"><li>Qatar University Institutional Review Board with the approval number QU-IRB 1456-EA/21</li></ul></div>

### Results

- A total of 179 participants completed the survey
- 27.4% (49/179) students had a current or previous leadership role at QU
- 40.8% (73/179) held a student leadership position prior to their enrollment at the university
- Participant characteristics are shown in Table 1
- Figure 1 shows the positive, negative, and neutral behavioral determinants of student leadership based on the TDF domains
- Figure 2 shows the key responsibilities mentioned by students with leadership positions at QU

### Results... continued

Table 1: Participants’ Characteristics (n = 179)	
Characteristic	Frequency, n (Percentage, %)
<b>Age (years)</b>	
17-22	146 (81.6%)
23-28	28 (15.6%)
29-34	2 (1.1%)
35-40	3 (1.7%)
<b>Gender</b>	
Male	24 (13.4%)
Female	155 (86.6%)
<b>College</b>	
Medicine	33 (18.4%)
Pharmacy	83 (46.4%)
Dental Medicine	8 (4.5%)
Health Sciences	55 (30.7%)
<b>Level of Study</b>	
Undergraduate	165 (92.2%)
Graduate	14 (7.8%)
<b>Nationality</b>	
Qatar	55 (30.7%)
Non-Qatari	124 (69.3%)

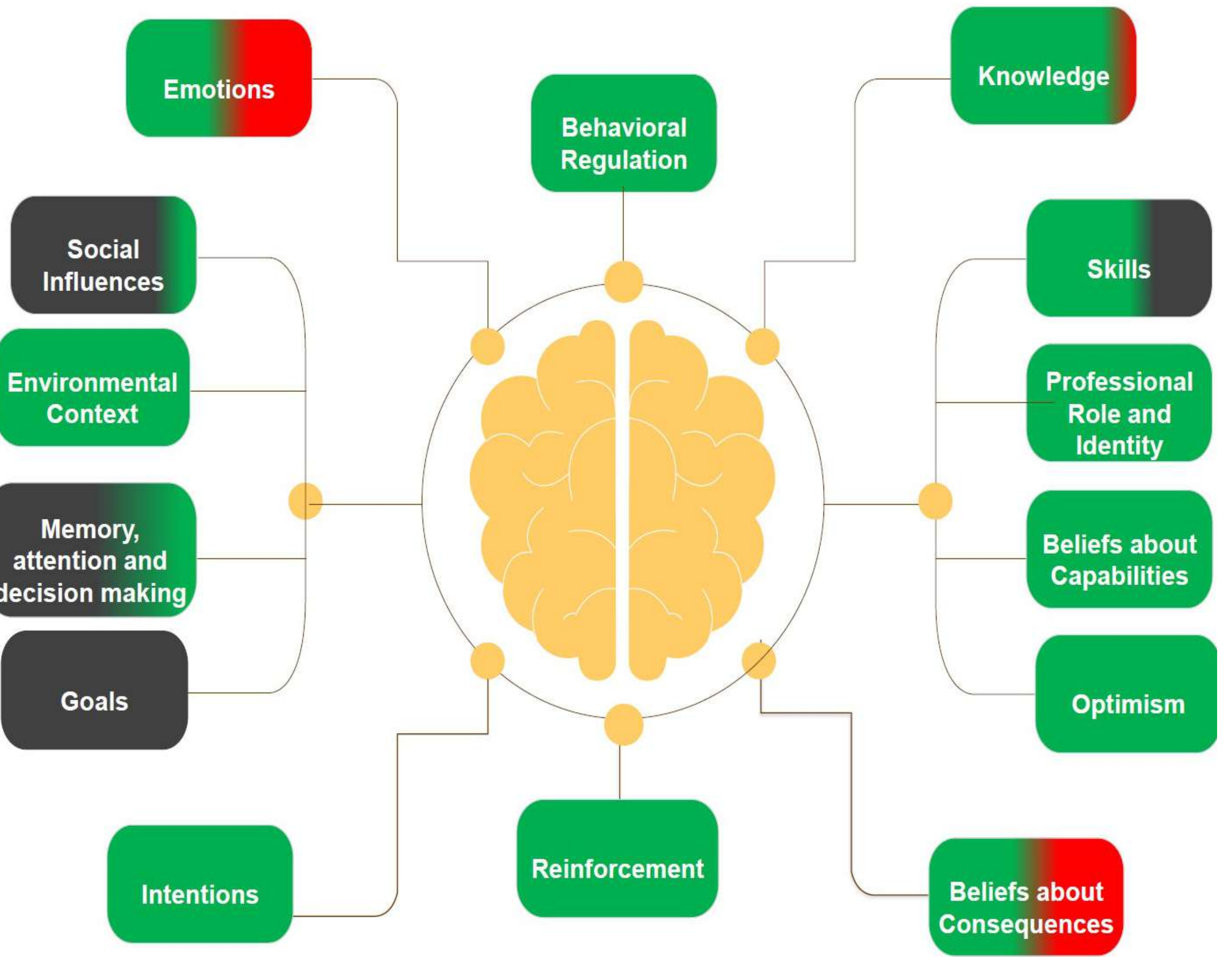


Figure 1 Behavioral Determinants of Student Leadership Based on TDF domains (Red: negative, Green: positive, Gray: neutral)



Figure 2 Word Cloud of Responsibilities Mentioned by Students with Current/Previous Leadership Positions at QU

#### 1 | Characteristics of a Successful Student Leader:

- Nearly all participants rated all the capabilities as very important to extremely important. The most highly rated capabilities were:
  - Organizing and managing time effectively
  - Admitting and learning from mistakes
  - Listening to different points of view
  - Working productively with others
  - Effective negotiation
- None of the capabilities were rated as not important by any of the participants

#### 2 | Indicators of a Student Leader’s Success:

- Positive feedback was the most important indicator of a student leader’s success

#### 3 | Required Support and Training by Student Leaders:

- Most students (63.3%) declared that they did not receive training for their leadership role
- The most suggested type of training identified by student leaders included: negotiation, communication, teamwork, and effective planning skills

### Strengths

- First study to investigate student leadership in Qatar University.
- First study to include all healthcare students.
- First study to investigate behavioral determinants based on a theoretical framework of behavioral change.
- First study to investigate support and training required by student leaders.
- High internal consistency (Cronbach’s alpha = 0.906) of the TDF items used in this questionnaire.

### Limitations

- Low response rate (13.2%) & unable to switch to paper-based survey due to COVID-19 pandemic
- High risk of non-response bias
- Potentially skewed towards pharmacy students’ (46.4%) perspectives
- Possibility of social desirability bias

### Conclusion

- Most of the TDF domains were positive, indicating that they were facilitators for student leadership
- Barriers included:
  - Belief that leadership would be time consuming and distract from academics
  - Negative emotion
  - Unawareness of how to apply for leadership positions
- Time management, learning from mistakes, listening, negotiation & working with others, were the most important capabilities for student leaders
- Positive feedback was the most important indicator of a leader’s success
- Most student leaders did not receive leadership training and suggested training sessions to develop the needed skills

### Recommendations

- To perform inferential statistics to identify relationships between variables measured
- To conduct focus groups to gain a deeper understanding of student leaders’ experiences
- To design leadership development training based on the findings of the study and test its effect
- To investigate students’ perspectives about leadership in practice settings

### References

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- Deane E, Stanley K. Student leadership in curriculum development and reform [Internet]. Sydney: Australian Government Office for Learning and Teaching; 2015 [cited 4 April 2021]. Available from: [https://lr.edu.au/resources/LE13\\_2839\\_Deane\\_Report\\_2015.pdf](https://lr.edu.au/resources/LE13_2839_Deane_Report_2015.pdf).



# Understanding Burnout in Community Pharmacists in Qatar during COVID-19 using the Job-Demands Resources theory: a Qualitative Study

Hiba Mohammed, Shahd Elamin, Dr Maguy El-Hajj, and Dr Alla El-Awaisi  
College of Pharmacy, QU health, Qatar University

## Background

- Community pharmacists are one of the most accessible front-liners against the COVID-19 pandemic
- Community pharmacists are at risk of burnout, a psychological syndrome that occurs due to prolonged exposure to stressors
- The literature exploring the factors that lead to burnout in community pharmacists during the COVID-19 pandemic is lacking
- The Jobs Demands-Resource (JD-R) model examines the interaction between job-related and personal-related demands and resources
- It then relates these factors to the subsequential outcomes of burnout and work engagement

## Study objectives

- To understand the factors that contribute to community pharmacists' burnout as explained by the JD-R Theory
- To identify currently used strategies by community pharmacists to mitigate burnout
- To make recommendations about interventions that could reduce burnout in community pharmacists during COVID-19

## Methods

- Qualitative study using focus groups
  - Phenomenological methodology
- Focus group guide based on the JD-R Model
- Population of interest: Community pharmacists
- Language: English

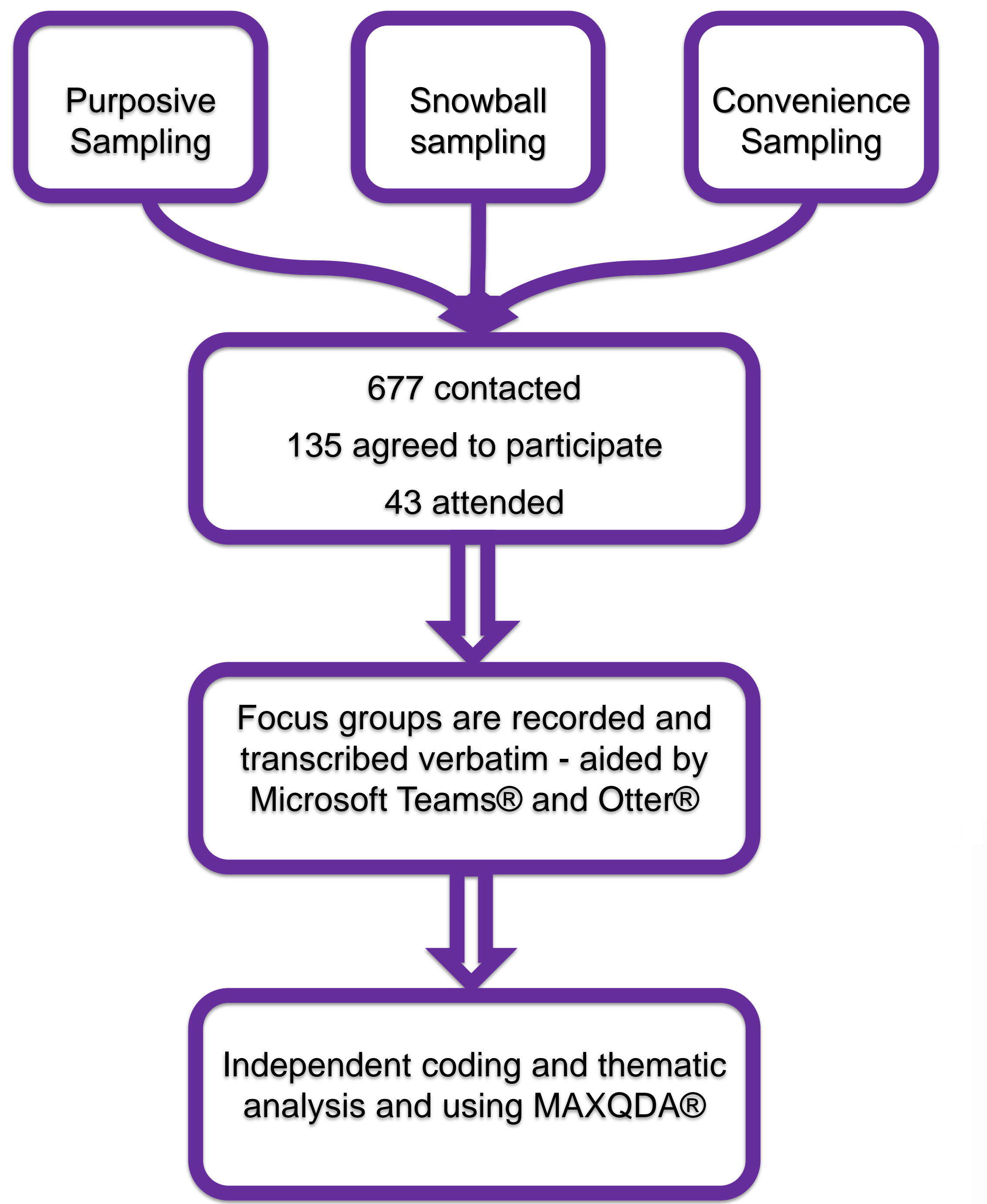
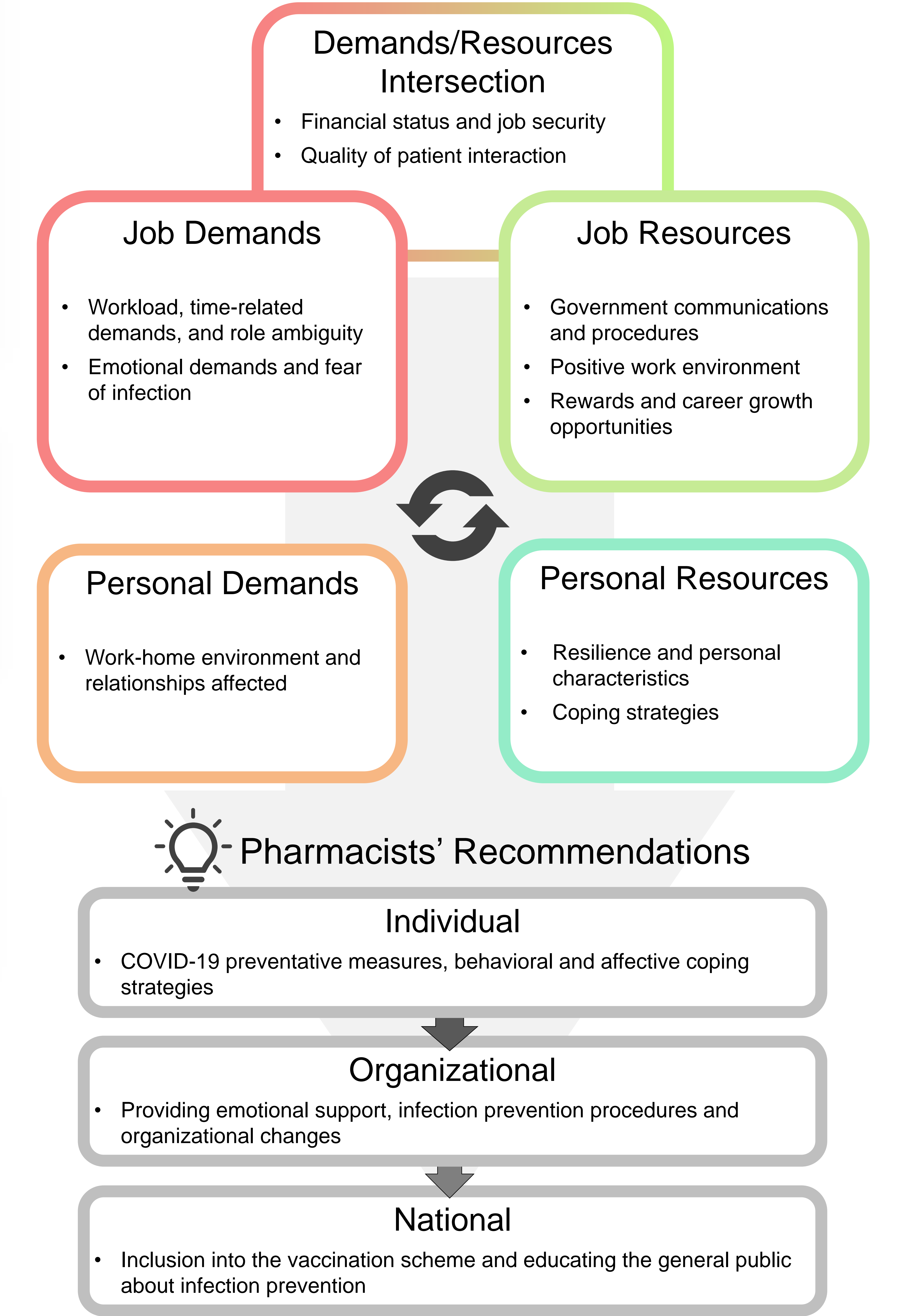


Figure 1: Schematic representation of the methods

## Results

- 6 focus groups, 5 dyadic and mini-focus groups, and 6 individual interviews were conducted
- Based on findings from 5 focus groups and 2 dyadic interviews with a total number of participants of 27, the following themes emerged



## Conclusion

- To our knowledge, this is the first study to examine the factors that influence burnout in community pharmacists during the COVID-19 pandemic
- The logistical and emotional demands identified are a call for policymakers to make specific interventions that improve pharmacists' wellbeing by:
  - Reducing workload through task allocation and adequate staffing
  - Raising awareness in patients on improving interactions
  - Mental health, counselling and self-help resources
- Future research is needed to understand the correlations between these factors and burnout
- The long-term mental health consequences in community pharmacists must also be identified



# Content Analysis of Students Created OSCE Analytical Checklists

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## Background

- Objective structured clinical examination (OSCE) assesses healthcare students' competency and skills.
- Analytical checklists and global rating scales used for grading OSCE.
- Formative feedback are not received by all students after their OSCEs.
- Students Cannot identify gaps in their performance.
- Self-assessment is used by students to evaluate their performance and get feedback.

## Objectives

Assess the comparability of students created analytical checklists to the faculty created analytical checklists in terms of numbers of items, themes and validity.

## Methods

- 11 out of 33 second year pharmacy students taking Pharmacy Professional Skills IV agreed to participate in the study, provided consent, and attended the students' analytical checklists workshop.
- Figure 1 represents the study process and methods.

## Manifest Content Analysis

- An analysis that is meant for describing what is occurring on the surface without deeper interpretation
  - It enables researchers to identify frequencies, categories data and numerically describe them.
- It involves three main steps:
- Familiarization with the data
  - Creation of codes, categories (themes) and description of categories and assessment of interrater reliability
  - Finalization of themes and reporting.

Table 1: Manifest Content Analysis Themes and Attributing Codes

Theme	Attributed code
Information Gathering	Patient information
	Medical history
	Medication reconciliation
	Lifestyle information
Patient Education	Education on the disease/diagnosis
	Education on medication
	Education on lifestyle modification
Follow Up	Self-monitoring
	Professional follow up
	Patient understanding
Therapeutic Rapport	Includes rapport building, patient confidentiality, introduction, answer further concerns.

## Results

Table 2: Total Number of Valid Items in Students- and Faculty-Created Checklists

Students	Valid/Total	50/60	83%
Faculty	Valid/Total	52/55	95%

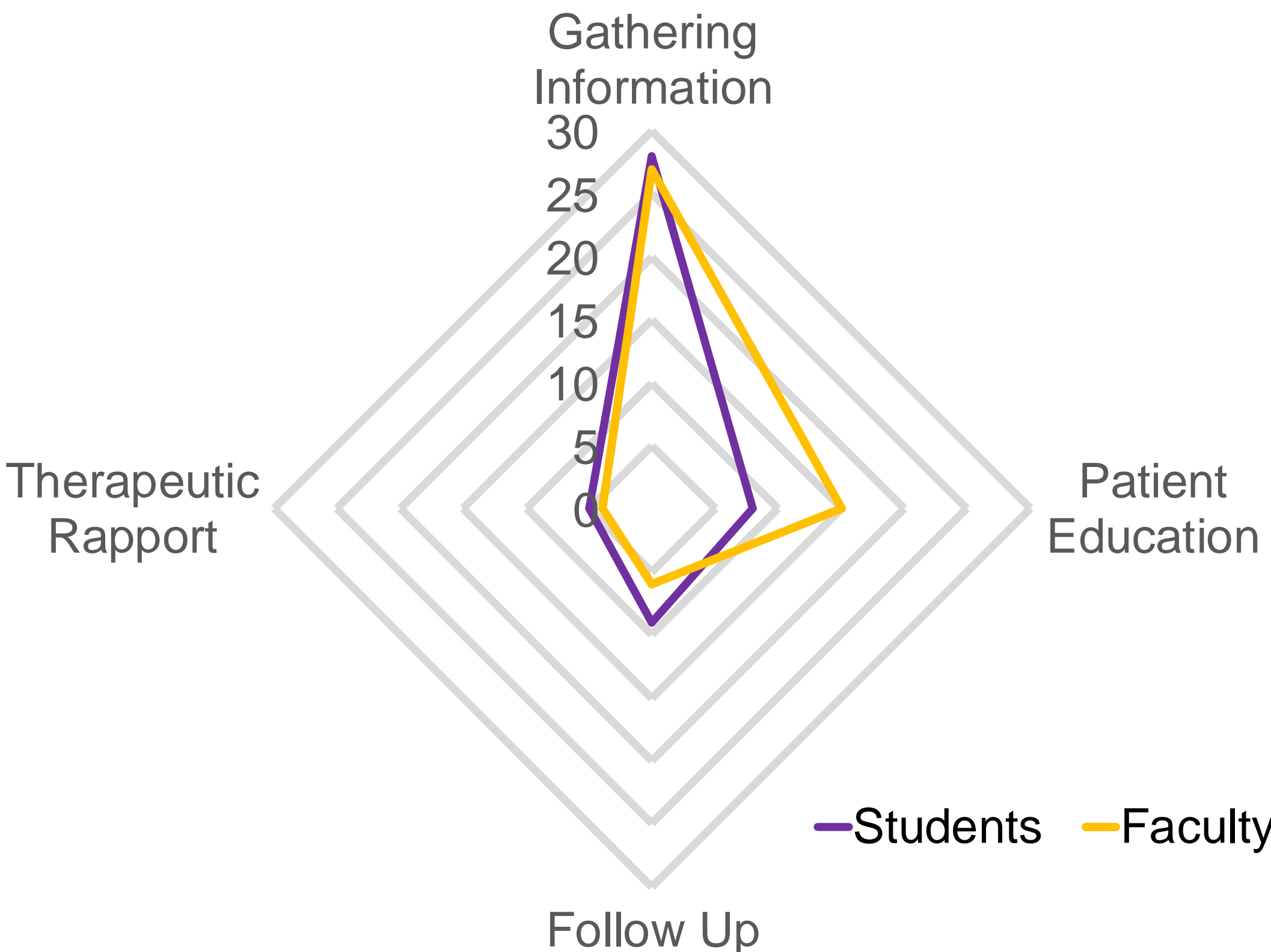


Figure 2: Students vs Faculty Number of Codes Attributed to Each Theme and its Scale

Table 3: Percentages of Matched Valid Items in Students- and Faculty-Created Checklists in Each Theme

Case Theme	AC	HTN	CVD	Overall
Information Gathering	86%	80%	90%	85%
Patient Education	33%	89%	100%	74%
Follow Up	100%	50%	100%	83%
Therapeutic Rapport	100%	100%	100%	100%

Table 4: Overall Similarity between Students- and Faculty-Created Checklists

Case	AC	HTN	CVD	Overall Matching in All Cases
Overall Matching in All Themes	77%	83%	93%	84%

## Discussion

- Students were able to obtain a total of 84% similar and valid items to the faculty members; this high percentage suggests good students' competency in checklist creation.
- Students' checklists included more information gathering points compared to patient education and compared to faculty checklists. This could be the result of adopting systematicity and lack of adequate knowledge.
- Our findings suggest that implementing regular students training workshops into PHAR341 course may improve marking behavior.
- Further studies with larger sample sizes are required to evaluate the true effects of analytical checklist workshops.

## Conclusion

- The analysis of the conducted workshop has shown that students created checklists are similar to those created by faculty members.
- Students created checklists were good in terms of validity as they had 83% valid items, this can facilitate students access to initial feedback and improve their performance based on it.
- Inclusion of checklist creating training workshops can be one step forward in the implementation of self-assessment and co-creation concepts in order to improve students' competency in simulation.

## Acknowledgement

The authors would like to thank Dr. Alla El-Awaisi and Dr. Monica Zolezzi for offering valuable guidance throughout the project.

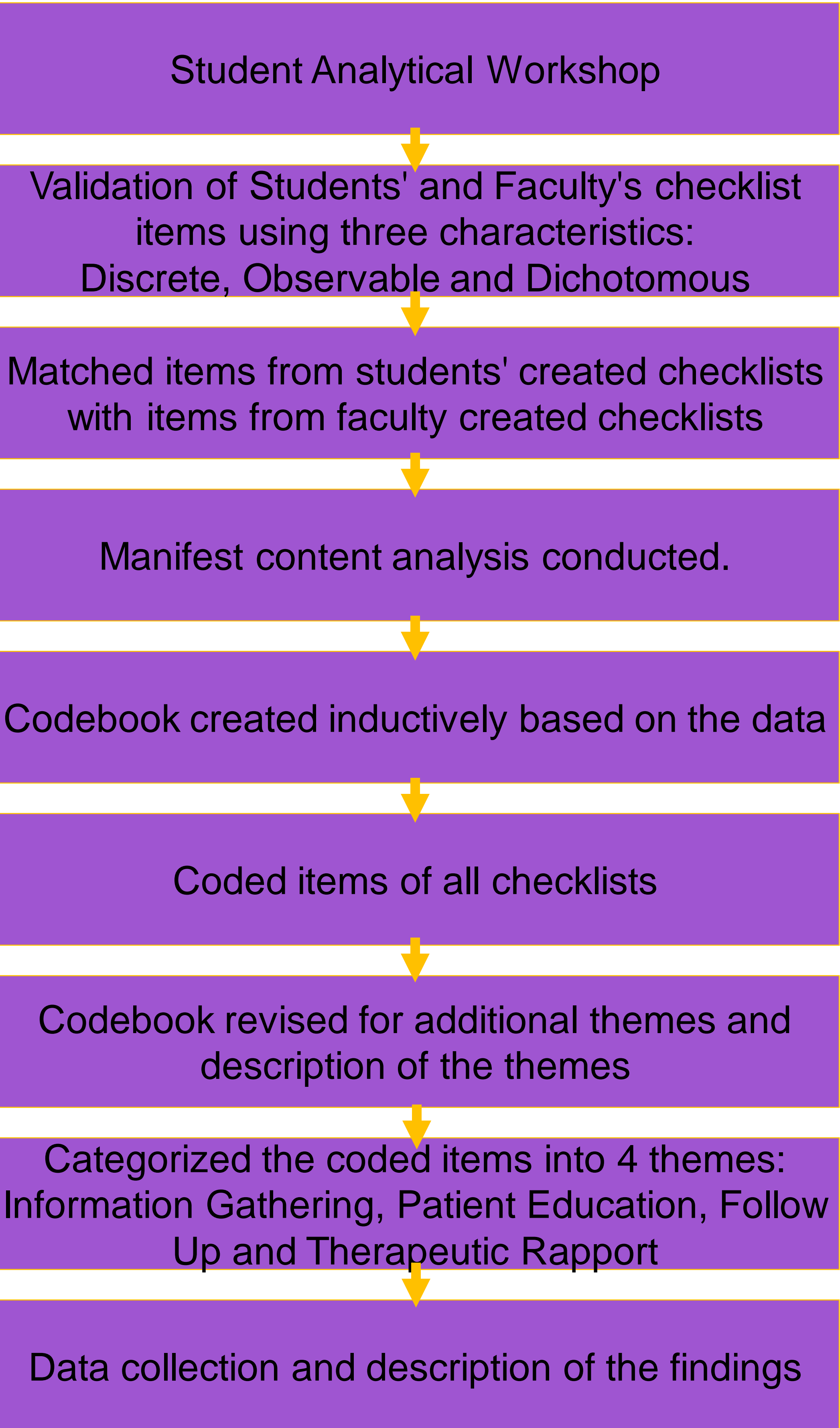


Figure 1: Schematic Representation of the Projects' Process



# Assessment of Patient Information Insert of Antibiotic Suspensions: A Descriptive Study

Aya Mohamed<sup>1</sup>, Doaa Mahmoud<sup>1</sup>, Bridget Javed<sup>2</sup> Ousama Rachid<sup>2</sup>

<sup>1</sup> Undergraduate student, College of Pharmacy, Qatar University

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## Background

- Health literacy is the ability to acquire, process, and comprehend written and oral health knowledge and resources in order to make informed health decisions.
- Low health literacy has been linked to the lack of health-related awareness, that can lead to undesired consequences like noncompliance, hospitalization, increased health-related costs, and impairment of patient's quality of life.
- Antibiotic suspensions require careful attention as they are reconstituted in Qatar by the patient or his care giver, and hence, instructions provided in their patient information leaflet should be readable and understandable by the consumer.
- High readability level in health-related materials can lead to undesirable consequences, including reduced compliance and medication errors.

## Study Objectives

- Inventory the educational information provided with antibiotic suspensions in Qatar.
- Asses the readability of the package inserts provided with antibiotic suspensions in Qatar.
- Assess reconstitution steps in comparison to standard reconstitution steps.

## Methods

Table 1 – Study methodology

Study Design	Descriptive study
Materials	<ul style="list-style-type: none"><li>• Inventory of all antibiotic suspensions available in Qatar</li><li>• All the package inserts of antibiotics suspensions were collected from community pharmacies, Health centers and hospitals, then assessed using 2 readability tools (FK and SMOG).</li></ul>
Inclusion/Exclusion Criteria	<ul style="list-style-type: none"><li>• Inclusion:<ul style="list-style-type: none"><li>◦ Printed package insert provided with product</li><li>◦ The product in the dry powder formulation</li><li>◦ Available in Qatar</li></ul></li><li>• Exclusion:<ul style="list-style-type: none"><li>◦ Suspensions that are already reconstituted</li><li>◦ Suspensions with no leaflets</li></ul></li></ul>
Outcomes	<ul style="list-style-type: none"><li>• Primary outcomes:<ul style="list-style-type: none"><li>- The SMOG and Flesch Kincaid score of each antibiotic leaflet</li></ul></li><li>• Secondary outcomes:<ul style="list-style-type: none"><li>- FK score for reconstitution steps (RS)</li><li>- Compare RS with the standard.</li></ul></li></ul>
Statistical tests	<ul style="list-style-type: none"><li>• Descriptive statistics, presented as means, frequencies and percentages</li></ul>

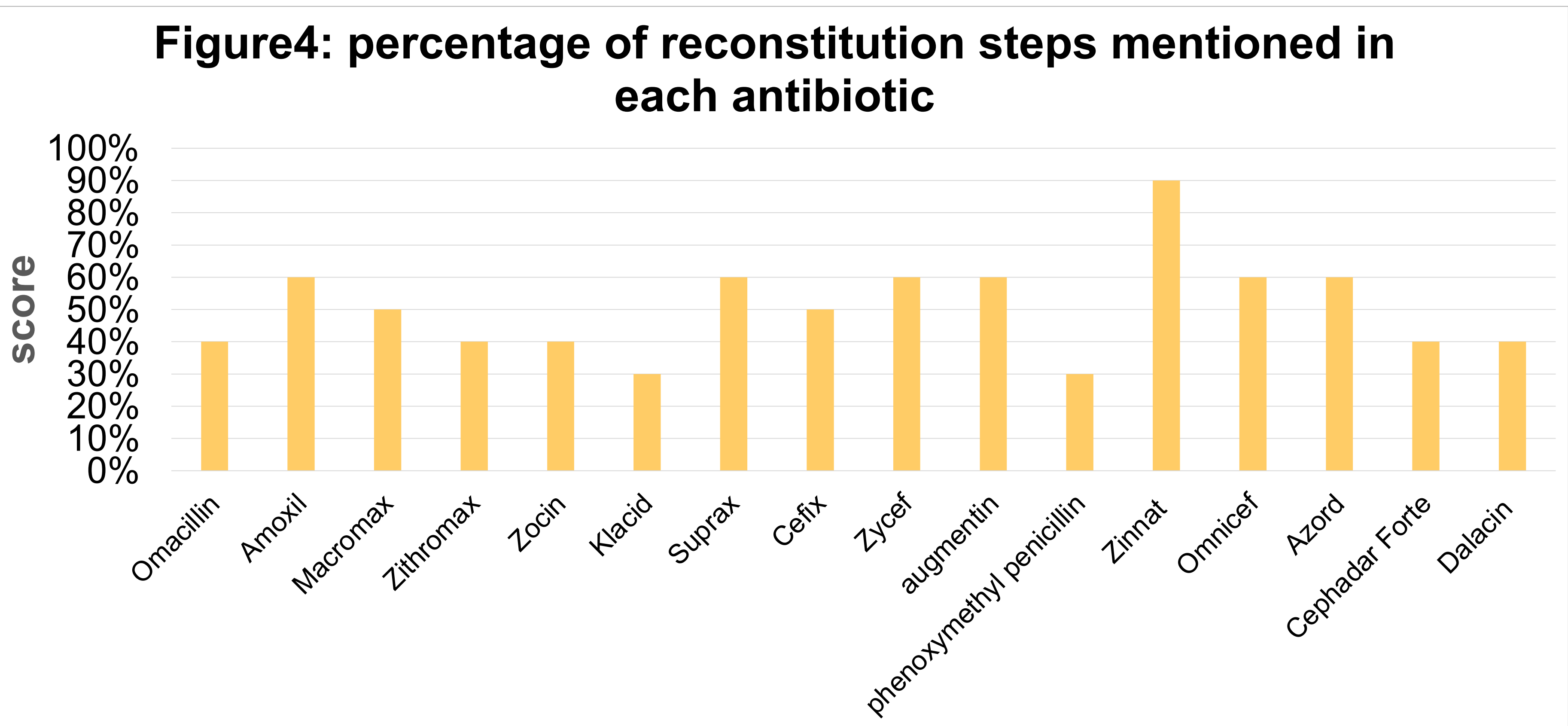
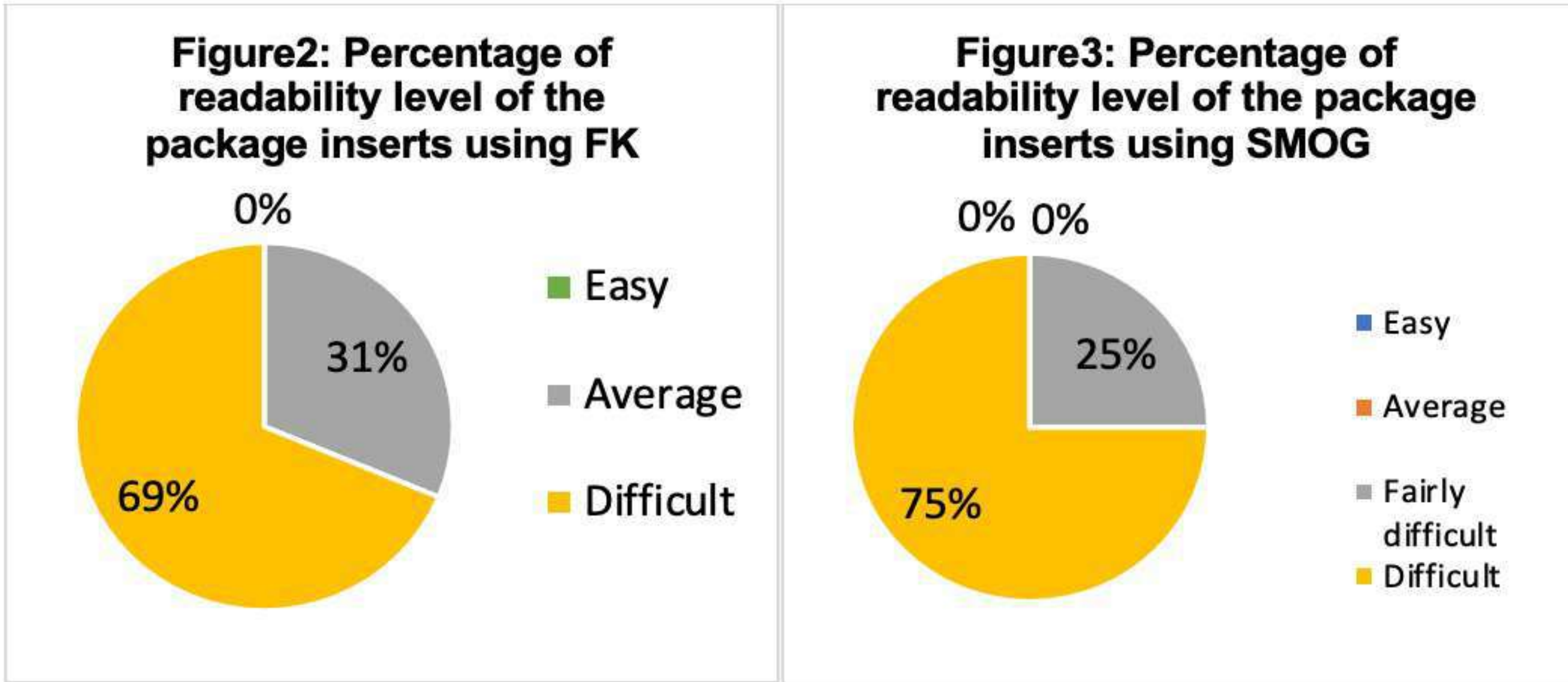
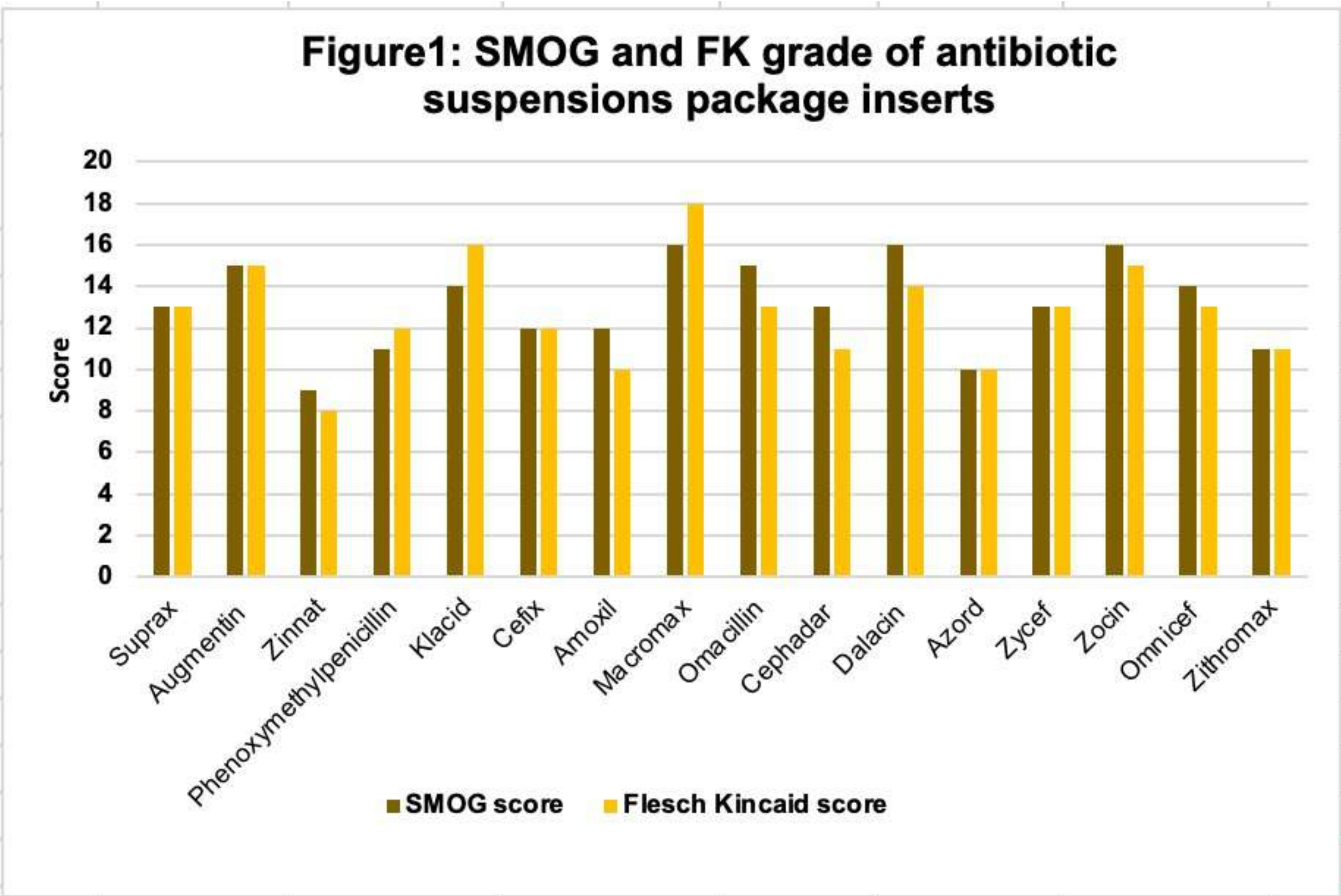
## Future Studies

- Designing and validating a scoring system for the standard reconstitution steps supposed to be provided with antibiotics.
- Comprehensibility test done on human subjects from the target population.
- Pharmacokinetic studies for the effect of using antibiotics inappropriately.

## Conclusions

In Qatar, all antibiotic suspension package inserts are above the eighth grade, which is the recommended level for written health-related educational materials. This can restrict the patient's understanding of the details found in these materials and contribute to non-compliance and medication errors.

## Results



## Acknowledgement

Thanks to WellCare, Kulud pharmacy, Old airport and Qatar University heath centers members, especially, Dr. Tamer, Dr. Salma and Dr. Omar, and thanks to Dr. Amina Binilles from HMC for facilitating for us the process of data collection.



# Community Pharmacists Contraceptive Counselling Practices: A Systematic Review

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## Background

- Unintended pregnancy (UP) is a global health problem with significant consequences on the health and well-being of mothers and fetuses<sup>1</sup>
- Contraceptives (CPs) are widely used to control UP; however, CPs are associated with major adverse events (MAEs) if not properly dispensed to the patient
- CPs are available in the community pharmacies as over the counter medications<sup>2</sup>
- Community pharmacists can play a vital role in reducing CPs related MAEs <sup>3</sup>
- No reviews in the literature describe the various areas of counselling practices of community pharmacists when dispensing CPs

## Objective

- The systematic review aims to:
  - Characterize the counseling practices of community pharmacists when dispensing contraceptive agents worldwide

## Methods

- Design:** Systematic review of the literature
- Databases:** PubMed, Embase, Google Scholar
- Key search terms:** Community pharmacists, contraceptives, counseling practices, patient education, dispensing practices, counseling experiences
- Study inclusion criteria:** Pharmacists counselling practices in various areas about CPs, pharmacists within community pharmacies, any type of contraceptives sells in community pharmacies, cross-sectional studies, articles published in English
- Study exclusion criteria:** Pharmacists behaviors or attitude toward counselling about CPs, non-English publications, emergency contraceptives, healthcare providers other than community pharmacists, unpublished articles, conference abstracts
- Quality assessment:** Joanna Briggs Institute (JBI) Critical Appraisal Checklist for prevalence studies<sup>4</sup>

## Results

- Out of 652 identified articles, four were eventually included in the analysis (Figure 1)
- The four studies were conducted between 2012 and 2017
- One study was conducted in the United States of America, one in Egypt, one in the United Arab Emirates, and one in Iran
- Two studies illustrated that pharmacists had a poor level of knowledge in areas related to CPs missed dose instruction
- Two studies demonstrated that pharmacists provide poor counseling about CPs side effects
- One study found that community pharmacists were more knowledgeable about CPs after the intervention

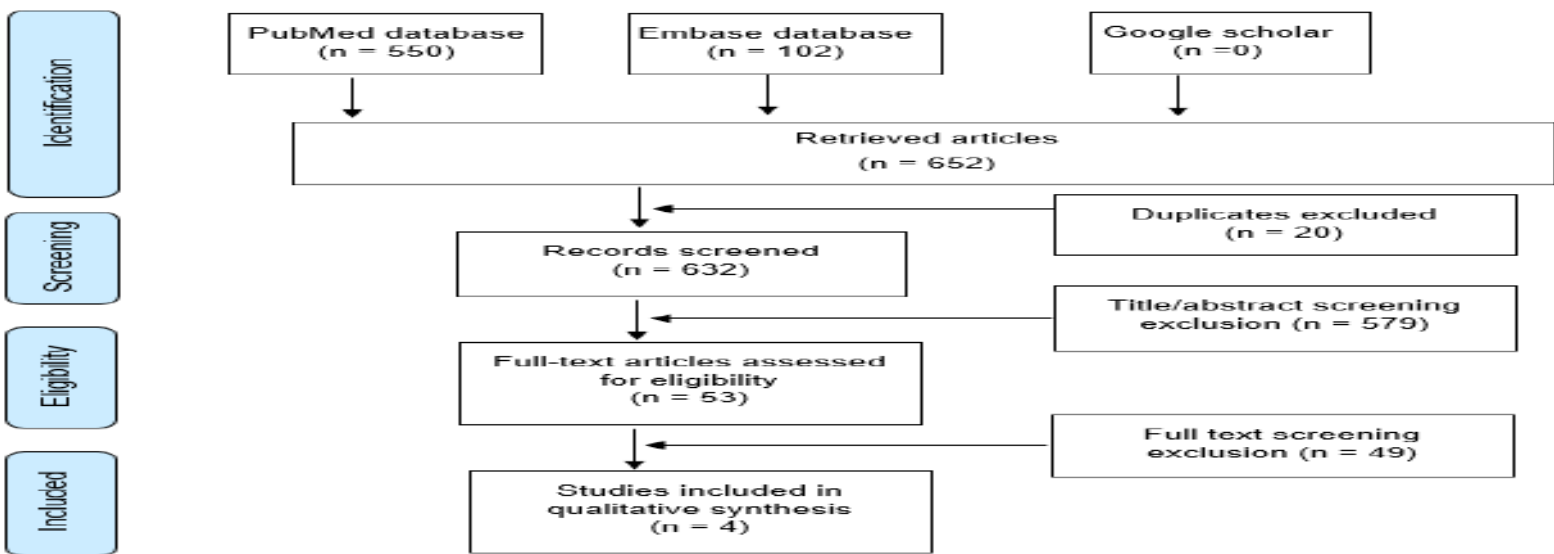
### Quality assessment:

- Two studies were high in quality and two were moderate in quality (Table 1)

Table1: Quality assessment results using JBI tool:

Score	Quality	Number of articles
≤49%	Low	0
50-69%	Moderate	2
≥70%	High	2

Figure 1: Flow diagram of the literature search and selection:



### Detailed Quality assessment results using JBI tool:

JBI Critical Appraisal Checklist for Studies Reporting Prevalence Data	Peter et al. (2015)	Mohamed et al. (2016)	Osama et al. (2017)	Sattari et al. (2012)
1. Was the sample frame appropriate to address the target population?	+	+	+	U
2. Were study participants sampled in an appropriate way?	+	+	+	+
3. Was the sample size adequate?	+	+	+	U
4. Were the study subjects and the setting described in detail?	+	+	+	+
5. Was the data analysis conducted with sufficient coverage of the identified sample?	N/A	N/A	N/A	N/A
6. Were valid methods used for the identification of the condition?	+	-	-	+
7. Was the condition measured in a standard, reliable way for all participants?	+	+	-	+
8. Was there appropriate statistical analysis?	+	+	+	+
9. Was the response rate adequate, and if not, was the low response rate managed appropriately?	-	+	-	U
#YES	7	7	5	5

### Counselling behavior results:

Authors (Year) Country	Number of pharmacists	Outcomes (counselling practices)
1. Peter et al. (2015) U.S.	41	<ul style="list-style-type: none"><li>67% of the pharmacists were more knowledgeable about contraception after the intervention.</li></ul>
2. Mohamed et al. (2016) Egypt	167	<ul style="list-style-type: none"><li>A 6-point scale ranging from 0-5 was used</li><li>The importance of taking CPs at the same time every day (mean 2.31, 95% CI 2.05–2.56)</li><li>The appropriate day to start taking CPs (mean 2.19, 95% CI 1.94–2.45)</li><li>Pharmacists were less likely to counsel about side effects and the missed doses of CPs with means of 2.03 (95% CI 1.82–2.24) and 1.78 (95% CI 1.56–2.00), respectively</li></ul>
3. Osama et al. (2017) United Arab Emirates	100	<ul style="list-style-type: none"><li>21 % of pharmacists had poor knowledge about CPs use</li><li>26 % of pharmacists had good knowledge about CPs</li><li>Pharmacists had poor knowledge about missed dose instructions</li></ul>
4. Sattari et al. (2012) Iran	150	<ul style="list-style-type: none"><li>Pharmacists had a poor level of knowledge in areas of CPs usage, side-effects, signs of problem, and contraindications</li><li>Pharmacists had a low level of counselling of contraceptives</li></ul>

## Conclusion

- Community pharmacists had poor knowledge in several aspects and domains of dispensing CPs
- Scope of pharmacy practice in the provision of appropriate and comprehensive counseling about CPs is limited
- Efforts need to be done to encourage community pharmacists involvement in continuing educational activities about counseling of CPs
- Further studies assessing community pharmacists counselling practices when dispensing CPs with more robust methodology should be conducted

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# Prescribing of Antihypertensives in Hypertension Treatment: A Systematic Review

Nada Abdelkader (B.Sc.(Pharm)), Maguy Elhajj (B.Sc.(Pharm), Pharm.D., BCPS)

## Background

- Hypertension, which is also known as high blood pressure, has affected over 1.13 billion people worldwide in 2015<sup>1</sup>
- Hypertension is one of the most common, preventable, and major risk factors for morbidity and mortality<sup>2</sup>
- Antihypertensive were found to reduce cardiovascular morbidity risk and premature deaths<sup>3</sup>
- It's important to achieve blood pressure control to prevent and reduce cardiovascular diseases risk<sup>4</sup>
- Several studies on antihypertensives' prescribing pattern are done worldwide
- Several guidelines were developed and updated on hypertension management<sup>5,6</sup>
- No global systematic reviews done to combine t evidence from studies in the last 10 years

## Study Objective

- This review aims to evaluate antihypertensive drug prescription patterns, trends, rationality and adherence to international guidelines for hypertension management worldwide

## Methods

- Inclusion criteria:**
  - Studies assessing antihypertensives' prescribing pattern/trends
  - Studies evaluating the appropriateness and rationality of antihypertensives' prescribing
- Exclusion criteria:** reviews, commentaries, guidelines, and editorials and if full text was not available
- Databases:** PubMed, Embase, Web of Science , Trip, Scopus, Wiley Online Library, ProQuest, Elsevier Science Direct, and Google scholar
- Limits:** Human, English, 1<sup>st</sup> of January 2010 up till 20<sup>th</sup> of March 2020
- Selection:** Three authors independently screened the titles and abstracts of articles, followed by full-text evaluation after the removal of duplicates
- Data extraction:** Two reviewers independently completed the data collection tool and CCAT tool. Disagreements were resolved by consensus
- Data analysis:** Interquartile range and percentiles and Cohen's Kappa were done using SPSS® v.26
- Protocol:** We worked from a pre-specified protocol that was registered on PROSPERO

## Results

Table 1. Study Characteristics

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
# articles	1	4	5	5	6	4	3	5	2	3	2
Country		# Articles			Country			# Articles			
Japan		2			KSA			2			
Nigeria		2			Kenya			1			
Egypt		1			Australia			1			
Jordan		1			Turkey			1			
Pakistan		1			Ireland			1			
USA		5			UAE			1			
India		3			Taiwan			1			
Bahrain		1			Mexico			1			
Malaysia		2									

## Results (Cont'd)

Figure 1. Flow Diagram of Literature Search

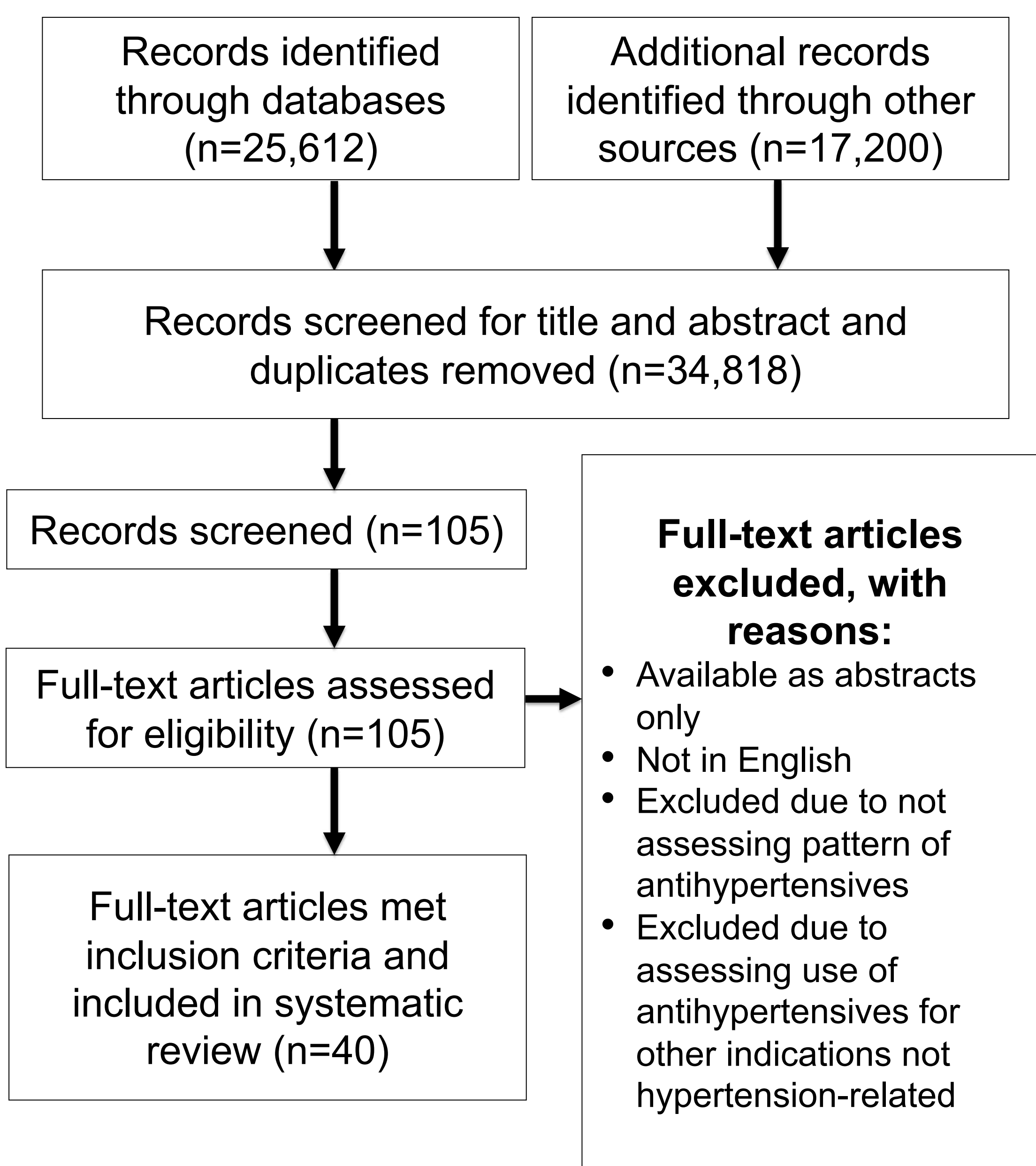
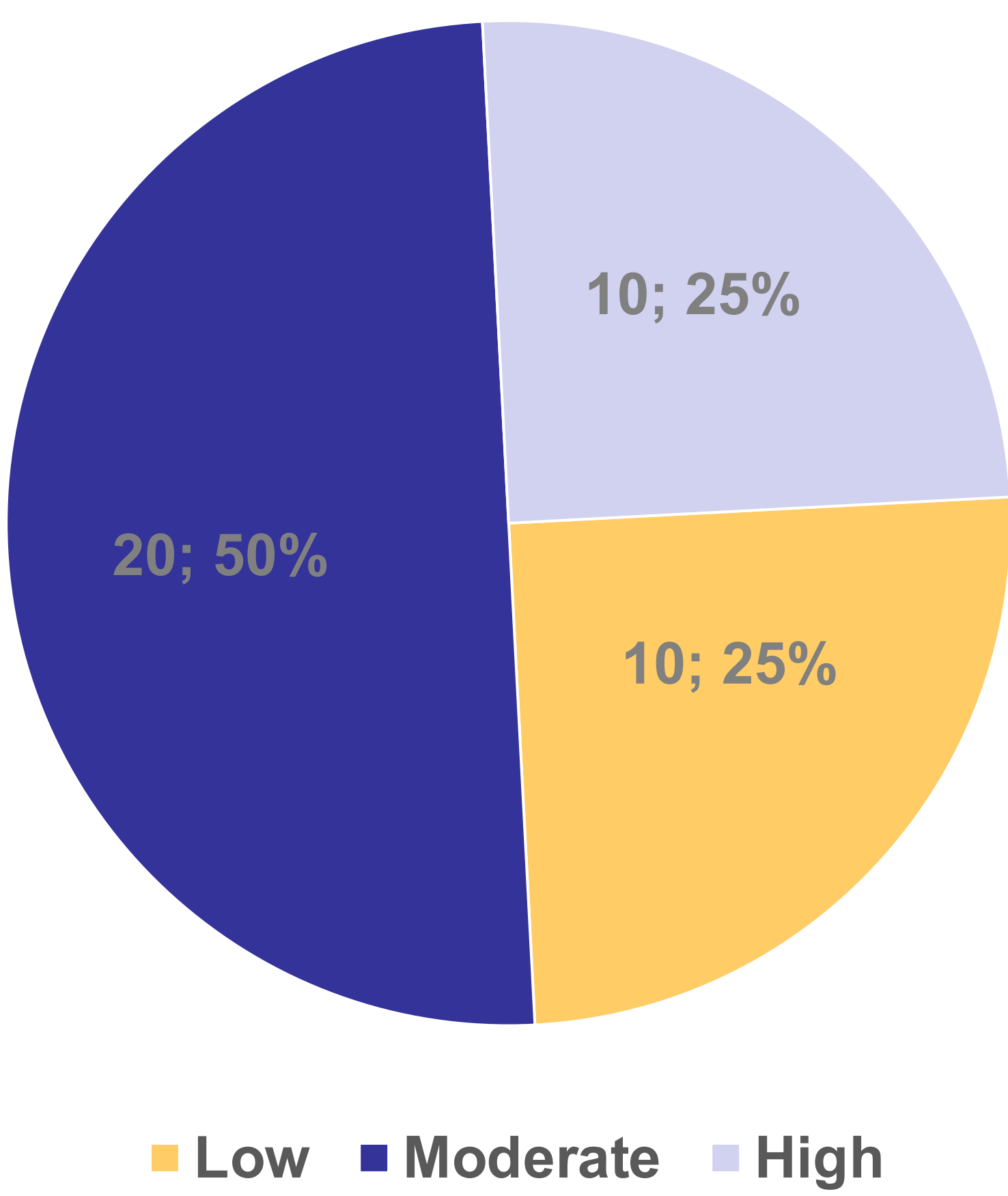


Figure 3. Quality Assessment of studies using CCAT Scores and Percentages



- Among general hypertensive patients ACEIs/ARBs were the most prescribed agents in 8 studies, CCBs, in 6 studies, BBs in 5 studies, and diuretics in 3 studies in monotherapy
- While 11 studies reported the use of dual combination therapy and 7 studies reported use of triple therapy
- The overall percentage of antihypertensives used reported the most common prescribed agent was diuretics in 4 studies
- Followed by ACEIs/ARBs as reported in 2 studies
- Among diabetic hypertensive patients the most prescribed antihypertensive agents were ACEIs/ARBs in 8 studies
- While the most common prescribed dual combination were ACEIs/ARBs+CCBs as per 5 studies
- Among patients IHD or heart disease CCBs, ARBs, and BBs were prescribed to 557.8%,44.5% and 43.6% of hypertensive patients with CVD as per 1 study
- In another study in Japan patients with heart disease 65.3%, 57.5%, 39.9% were on CCBs, ARBs, and BBs respectively
- Among patients with CKD or renal disease most common agents used in 1 study were CCBs and ARBs
- While the most common 2-drug combination was CCBs+ARBs

## Results (Cont'd)

- CCBs, ARBs, and BBs were prescribed to 52.4%, 39.5%, and 36.2% of hypertensive patients with kidney disease respectively in 1 study in Taiwan
- Another study reported 40% were on CCBs and 23% on ACEIs
- Among elderly hypertensive patients 2 studies reported ACEIs/ARBs were most prescribed while 1 study in post-menopausal women reported ARBs as most frequently used
- Only 4 studies directly assessed their prescribing pattern to identify if their practice is adherent to guidelines or not
- Guidelines used in the assessment included the seventh and eight Joint National Committee guidelines (JNC7, JNC8), NICE, and European guidelines (ESH/ESC, 2007)
- Other national guidelines were used such as Japanese, Egyptian, and Malaysian
- Majority of the studies reported that their practice was in concordance with guidelines
- The CCAT quality tool revealed that majority of studies were of moderate quality (50%)
- The rest of the studies were reported as low (25%) and high quality (25%)
- The inter-rater agreement was found to be 0.548 which is moderate agreement

## Conclusions

- The most prescribed agents reported were ACEIs/ARBs
- Second most prescribed were CCBs, followed by BBs and diuretics
- Majority of studies included were of moderate quality
- Majority of practices are in concordance to guidelines according to the included studies
- Further studies on prescribing pattern worldwide must be done

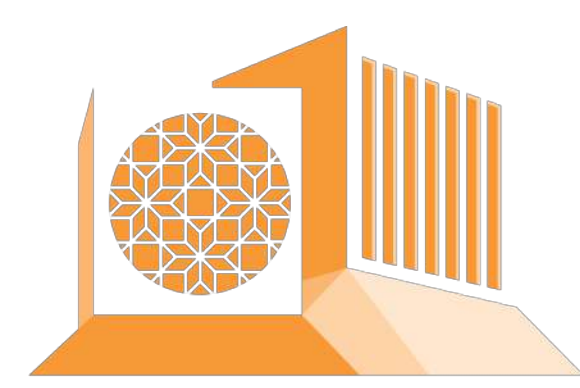
## Future Studies

- Prescribing patterns of antihypertensives worldwide and assessing its adherence to most updated hypertension guidelines
- Assessing prescribing pattern in special populations including diabetic patients, renal disease patient, heart failure, ...etc.

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ACEIs: Angiotensin converting enzyme inhibitors, CCBs: calcium channel blockers, BBs: beta blockers, ARBs: angiotensin receptor blockers



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# Effect of Pharmacogenetics-Based Decision Support Tools in Improving Depression Outcomes: A Systematic Review

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## Background

Pharmacogenetic (PGX) testing has shown promise addressing inadequate response to antidepressants. There are plenty of PGX tests available in the market; however, for the most part, there is limited supportive evidence of their clinical utility. Although previous systematic reviews (SRs) of the published literature have been conducted, variable outcomes in relation to PGX testing efficacy and safety were reported. In view of more recent randomized controlled trials (RCTs) published, an updated SR is called upon.

## Study Objectives

- To summarize, update, and assess the quality of the available evidence regarding antidepressant-related PGX testing.
- To estimate the impact of using PGX-based decision support tools in depression clinical outcomes, including the outcomes, including the Middle East and North Africa (MENA) region.

## Methods

- Inclusion criteria:** SRs and RCTs that assess the safety and efficacy of PGX testing in patients with depression.
- Exclusion criteria:** Meta-analysis only, narrative reviews, RCTs included in eligible SRs, and animal studies.
- Databases:** PubMed, EMBASE, SCOPUS
- Search limits:** Human studies, from inception until June 30, 2020.
- Study selection:** Titles and abstracts were screened, and based on full text review, eligible studies were selected for inclusion.
- Data extraction:** Relevant data were extracted from individual studies using a standardized sheet.
- Quality assessment:** Crowe Critical Appraisal Tool (CCAT).
- Protocol:** Registered in the International Prospective Register of Systematic Reviews (PROSPERO) database with registration ID: CRD42020182936.

## Results

- Results of SRs have provided weak evidence on the efficacy of PGX testing especially in patients with moderate-severe depression.
- There is a lack of evidence on safety outcomes reported in SRs.
- GeneSight was the most commonly studied test.
- RCTs with better methodologies showed clinical promise regarding efficacy.
- There is no available evidence regarding PGX testing in the MENA region.

## Results Cont'd

Figure 1. Flow Diagram of Selection Process

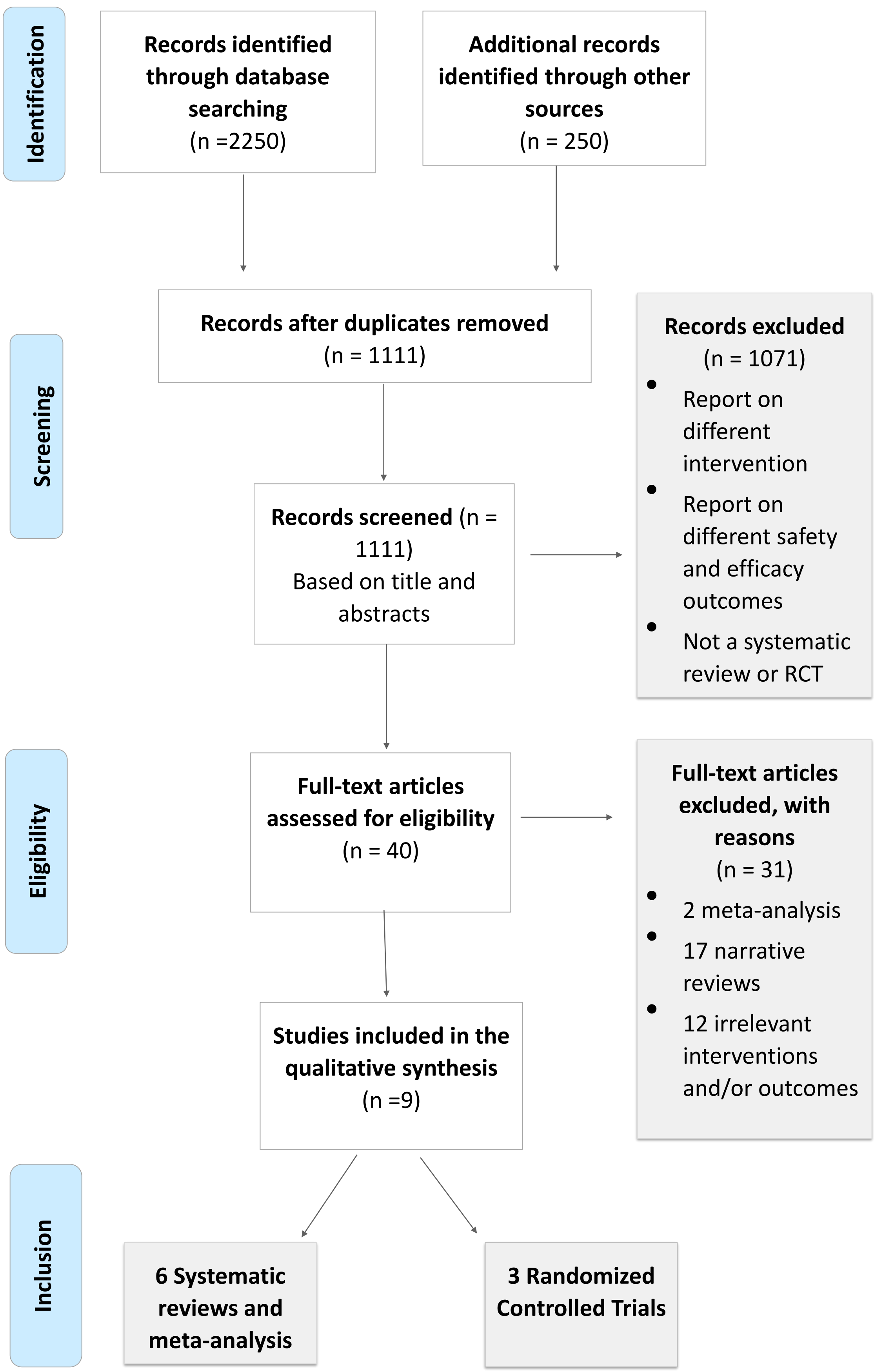


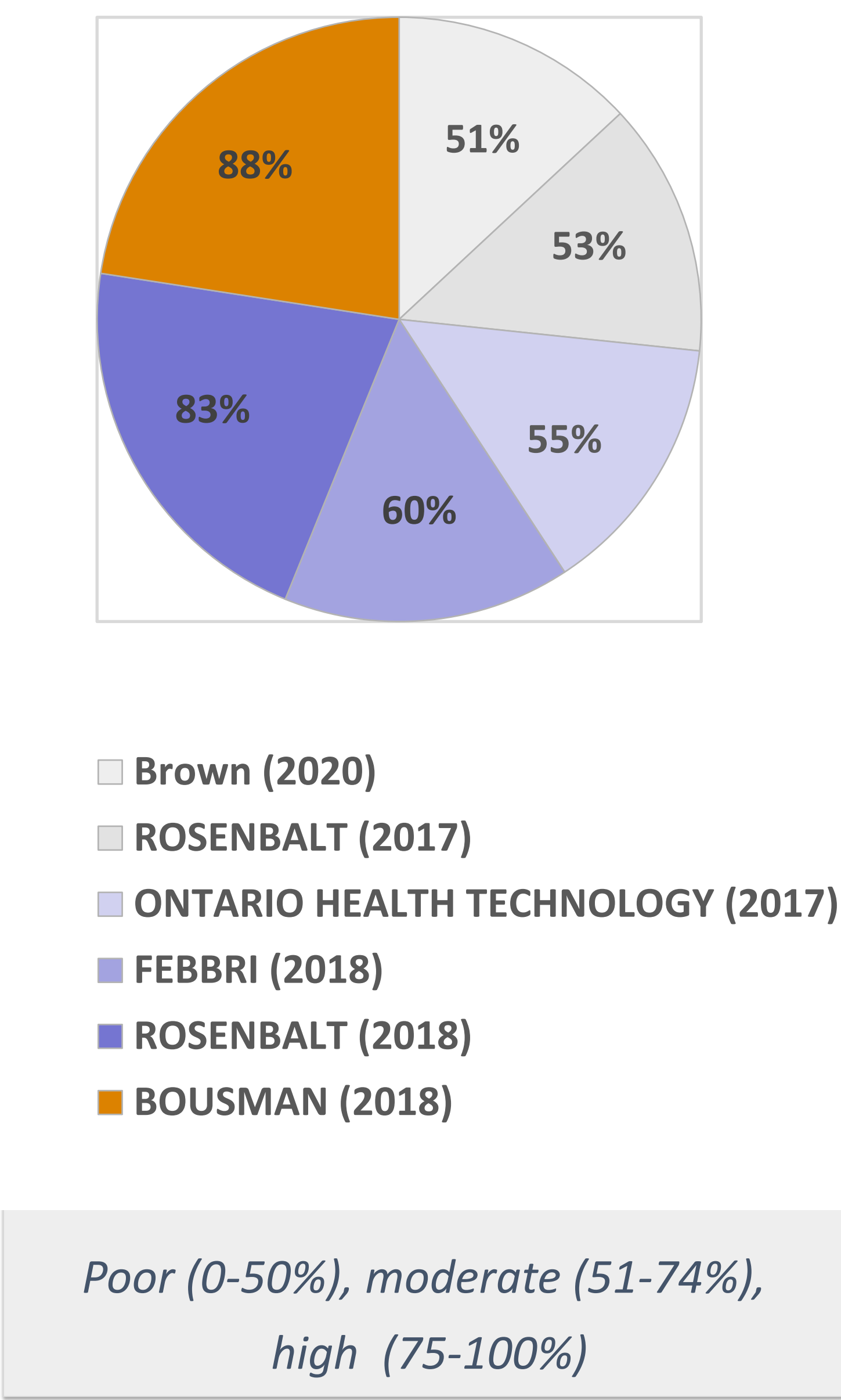
Table 1. Randomized Controlled Trials Findings

Study	Characteristics	Safety	Efficacy
Han et al. <sup>1</sup> (2018)	Sample size: 100 Duration: 8 weeks Participants: Koreans who failed previous anti-depressant Tool: Neuropharmagen	Side effects Frequency** Intensity** Burden**	Mean change in depression score** Response** Remission
Greden et al. <sup>2</sup> (2019)	Sample size: 1398 Duration: 8 weeks Participants: Adults with uncontrolled depression Tool: GeneSight®	Side effects n. of patients experienced side effects	Mean change in depression scores Response ** Remission**
Michael et al. <sup>3</sup> (October, 2019)	Sample size: 912 Duration: 8 weeks Participants: Adults with uncontrolled depression and gene drug-interaction Tool: GeneSight®	N/A	Mean change in depression score** Response rate** Remission rate**

\*\* Statistically significant for PGX guided treatment. All efficacy outcomes were measured using Hamilton Depression Rating Scale(HAM-D).

## Results Cont'd

Figure 2. Quality Scores of Systematic Reviews



## Conclusion

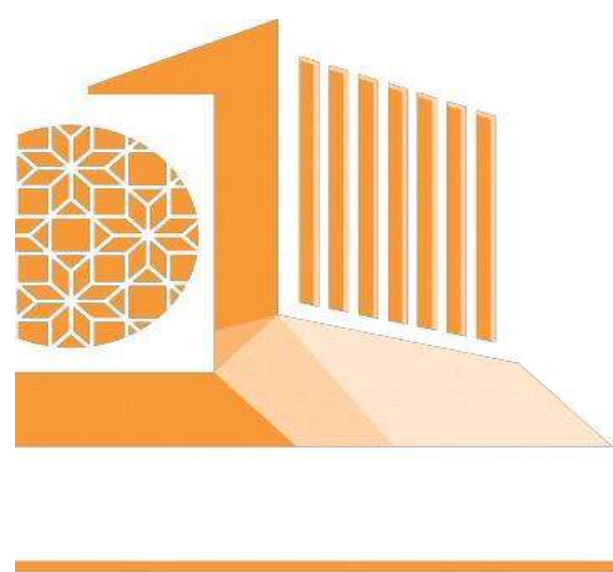
- This SR summarizes findings, provides updates on and assesses the quality of available SRs on the clinical utility of PGX testing in depression.
- Available SRs are of poor quality and have shown substantial variability on depression clinical outcomes when treatment is guided by PGX testing.
- Findings of this study have demonstrated that PGX-testing prior to treatment initiation improves efficacy outcomes at 8 weeks.
- Further studies are warranted to assess PGX-testing impact on safety outcomes.

## Future Studies

- Conducting pragmatic RCTs with large sample size for long duration to assess the impact of PGX testing on safety outcomes including adverse effects, tolerability, and suicide.
- Conducting pragmatic RCTs that compare between different PGX tests in patients with depression.
- Conducting studies that assesses the impact of PGX-testing in the MENA region.

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# Use of ibuprofen for the closure of patent ductus arteriosus in preterm infants. A systematic review of meta-analyses

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<sup>1</sup>College of Pharmacy, Qatar University, Qatar, <sup>2</sup>Department of Epidemiology and Preventive Medicine, Monash University, Australia, <sup>3</sup>Pharmacy Department, Hamad Medical Corporation, Qatar

## Background

- The first-line drugs in the treatment of hemodynamically significant patent ductus arteriosus (PDA) is Indomethacin and Ibuprofen
- Due to the medications side effects, the use of paracetamol is becoming widespread
- Several Meta-analyses (MA) and network MA (NMA) have recently been published regarding the efficacy and safety of different regimens. However, a comprehensive overview of systematic reviews in this area is not present

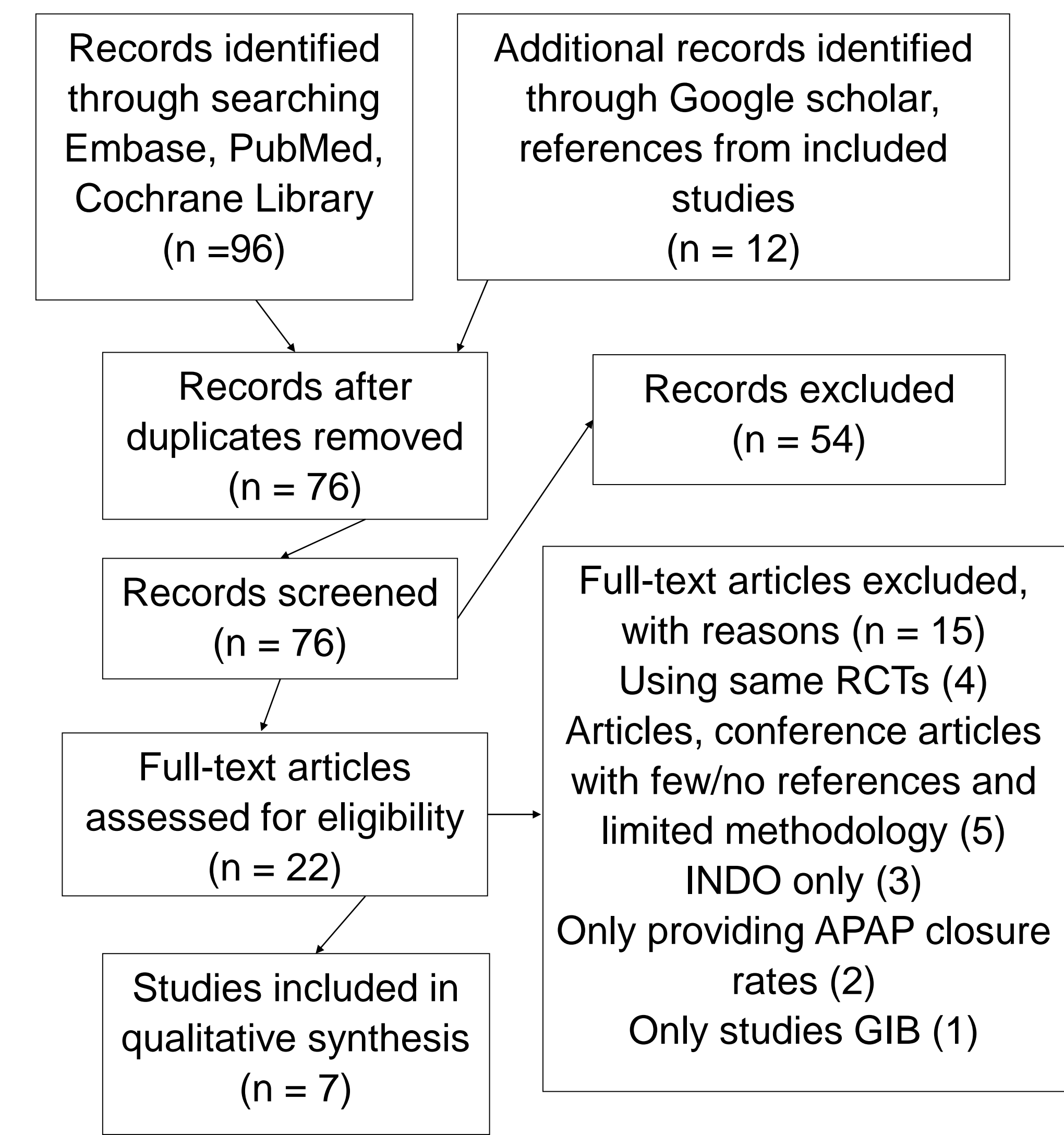
## Objective

- To summarize the evidence for the effectiveness and safety of ibuprofen (IBU) for PDA closure, comparing it to acetaminophen (APAP) and indomethacin (INDO) for the treatment of clinically diagnosed hemodynamically significant PDA in preterm infants

## Methods

<b>Study design</b>	• Systematic review of MA
<b>Electronic databases</b>	• PubMed • Embase® • Cochrane Database of Systematic Reviews • Google scholar
<b>Search strategy</b>	• Population ( e.g. patent ductus arteriosus) • Drug (e.g. Ibuprofen, Indomethacin, Paracetamol)
<b>Inclusion</b>	• Treatment of hemodynamically significant PDA • Ibuprofen versus either paracetamol or indomethacin • Full text, English language
<b>Exclusion</b>	• Updates • Expert opinions • Narrative reviews • Reviews of Prophylaxis
<b>Data collection</b>	• Data collection sheet on excel • Two authors extracted the data independently
<b>Other tools</b>	• PRISMA for reporting

## Results



## Results

**Table 1.** Outcomes reported for at least one pairwise comparison

	Marconi, 2019	Ohlsson, 2018	Ohlsson, 2018	Loomba, 2015	Jones, 2011	Mitra, 2018	Huang, 2018
<b>PDA closure</b>	yes	yes	yes	yes	yes	yes	yes
<b>Need for surgical ligation</b>	yes		yes	yes		yes	
<b>Mortality</b>	yes	yes		yes	yes	yes	yes
<b>Necrotizing enterocolitis (NEC)</b>	yes		yes	yes	yes	yes	yes
<b>Bronchopulmonary dysplasia (BPD)</b>	yes			yes	yes	yes	yes
<b>Intraventricular haemorrhage (IVH)</b>	yes			yes	yes	yes	yes
<b>Intestinal perforation</b>	yes			yes			
<b>Gastrointestinal bleeding (GIB)</b>	yes	yes		yes			yes
<b>Oliguria</b>	yes		yes			yes	
<b>Serum creatinine level</b>		yes	yes	yes			

**Table 2.** Efficacy reported for PDA closure

Study	Drug 1	Drug 2	Data	Effect size	heterogeneity	SS	Quality
Ohlsson (2018)	IBU	INDO	24 RCTs 1590 infants	RR 1.07 (0.92, 1.24)	I <sup>2</sup> = 0%	no	High
	oral IBU	INDO	8 RCTs 272 infants	RR 0.96 (0.73, 1.27)	I <sup>2</sup> = 0%	no	
Marconi (2019)	IBU	INDO	19 RCTs, 12 observational	OR 0.88 (0.71, 1.11)	I <sup>2</sup> = 0%	no	Low
	IBU	INDO	Direct and indirect	OR 0.89 (0.68, 1.17)	I <sup>2</sup> = 0%	no	
Ohlsson (2018)	IBU	APAP	5 RCTs 559 infants	RR 0.95 (0.75, 1.21)	I <sup>2</sup> = 0%	no	High
Marconi (2019)	APAP	IBU	9 RCTs, 1 observational	OR 1.02 (0.72, 1.44)	I <sup>2</sup> = 0%	no	Low
	APAP	IBU	Direct and indirect	OR 1.22 (0.77, 1.91)	I <sup>2</sup> = 0%	no	

**Table 3.** Safety reported for neonatal mortality

Study	Drug 1	Drug 2	Data	Effect size	Heterogeneity	Significance	Quality
Marconi 2019	INDO	IBU	12 RCTs, 11 cohort studies	OR 1.02 (0.77,0.67)	I <sup>2</sup> = 0%	Yes in favor of INDO	Low

**Table 4.** Safety reported for NEC

Study	Drug 1	Drug 2	Data	Effect size	Heterogeneity	Significance	Quality
Ohlsson, 2018	IBU	INDO	18RCTs, 1292 infants	RR 0.68 (0.49, 0.94)	I <sup>2</sup> = 0%	Yes, in favor of oral iv IBU	High
	Oral IBU	INDO	7RCTs, 249 infants	RR 0.41 (0.23, 0.73)	I <sup>2</sup> = 0%	Yes in favor of oral IBU	

**Table 5.** Safety reported for BPD

Study	Drug 1	Drug 2	Data	Effect size	Heterogeneity	Significance	Quality
Marconi 2019	IBU	INDO	8 RCTs, 7 cohort studies	OR 0.89 (0.81,0.99)	I <sup>2</sup> = 0%	Yes in favor of indo	Low

**Table 6.** Safety reported for IVH

Study	Drug 1	Drug 2	Data	Effect size	Heterogeneity	Significance	Quality
Marconi 2019	IBU	INDO	12 RCTs,7 cohort studies	OR 1.25 (1.01,1.56)	I <sup>2</sup> = 0%	Yes, in favor of IBU	Low
	IBU	INDO	Direct and indirect	OR1.27 (1.00,1.62)	I <sup>2</sup> = 0%	Yes, in favor of IBU	

**Table 7.** Safety reported for GIB

Study	Drug 1	Drug 2	Data	Effect size	Heterogeneity	Significance	Quality
Ohlsson,2018	APAP	IBU	4 RCTs, 537 infants	RR 0.28 (0.12,0.69)	I <sup>2</sup> = 0%	Yes, in favor APAP	High
Huang, 2018	APAP	IBU	4 RCTs, 527 infants	RR 0.82 (0.11,0.73)	I <sup>2</sup> = 0%	Yes, in favor APAP	Low
Marconi 2019	IBU	APAP	5 RCTs	OR 3.51 (1.36,9.08)	I <sup>2</sup> = 0%	Yes, in favor APAP	Low

## Conclusion

- Overall assessment of treatments shows that IBU is equivalent to INDO and APAP for PDA closure
- For IVH and NEC, some evidence indicates IBU to be statistically superior to INDO, but no different to APAP
- For GIB, IBU is equivalent to INDO, but APAP has significantly lower incidence of GI bleeding than IBU

## Reference

This poster is based on the publication: Al-Shaibi S, Abushanab D, Alhersh E, Kaddoura R, Abdul Rouf P, Al-Badriyeh D. The use of ibuprofen, including versus indomethacin or paracetamol/acetaminophen, for the closure of patent ductus arteriosus in preterm infants. A systematic review of meta-analyses. Journal of Comparative Effectiveness Research (2021); *Accepted*.





# Caffeine for the treatment of apnea in the neonatal intensive care unit: A systematic overview of meta-analyses

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## Background

- Apnea of prematurity (AOP) is a common developmental complication in preterm infants, which may be caused by no or insufficient respiratory drive
- Caffeine is a common treatment for neonatal intensive care management of the developmental complication of apnea of prematurity in preterm infants
- Several meta-analyses (MAs) on the performance of caffeine against the apnea however, they are overlapping on quantity, quality and the variability in focus

## Objectives

- To summarize and assess the quality of all the reported outcomes of caffeine for the management of apnea in all published MAs

## Methods

Study design	An overview of meta-analyses
Reporting guideline	PRISMA tool
Data sources	<ul style="list-style-type: none"><li>➢ PubMed</li><li>➢ Embase</li><li>➢ Google scholar</li><li>➢ Cochrane Database, Systematic Reviews</li></ul>
Key terms	Apnea, Caffeine, Methylxanthine, Intensive Care, Neonatal, Infant, and Newborn
Inclusion criteria	<ul style="list-style-type: none"><li>➢ Caffeine for treatment</li><li>➢ Full text article</li><li>➢ English, MAs</li></ul>
Exclusion criteria	<ul style="list-style-type: none"><li>➢ Prior versions of updated MAs</li><li>➢ Prophylactic caffeine</li></ul>
Quality assessment	AMSTAR-2 tool
Risk of bias assessment	ROBIS tool
Data abstraction	Data collection form
Data analysis	<ul style="list-style-type: none"><li>➢ Descriptive data</li><li>➢ Microsoft excel 2016</li></ul>

## Results

- Out of 979 identified MAs, 7 were included in the analysis
- 2 MAs showed no significant differences in the rate of apnea between Theophylline and Doxapram against caffeine
- 1 MA showed the rate of apnea to be lower with Caffeine against placebo
- 1 MAs indicated enhancing in the effectiveness against apnea via early administration of caffeine
- 3 MAs revealed that the safety outcomes (i.e., less tachycardia) were associated with lower and earlier caffeine administration
- The quality of MAs based on AMSTAR-2 ranged from critically low (n=1), low (n=1), moderate (n=2), to high (n=3) (Figure 1))
- The risk of bias based on ROBIS was unclear (n=2), low (n=4), and high (n=1) (Figure 2)

Figure 1: Quality assessment of included MAs based on AMSTAR-2

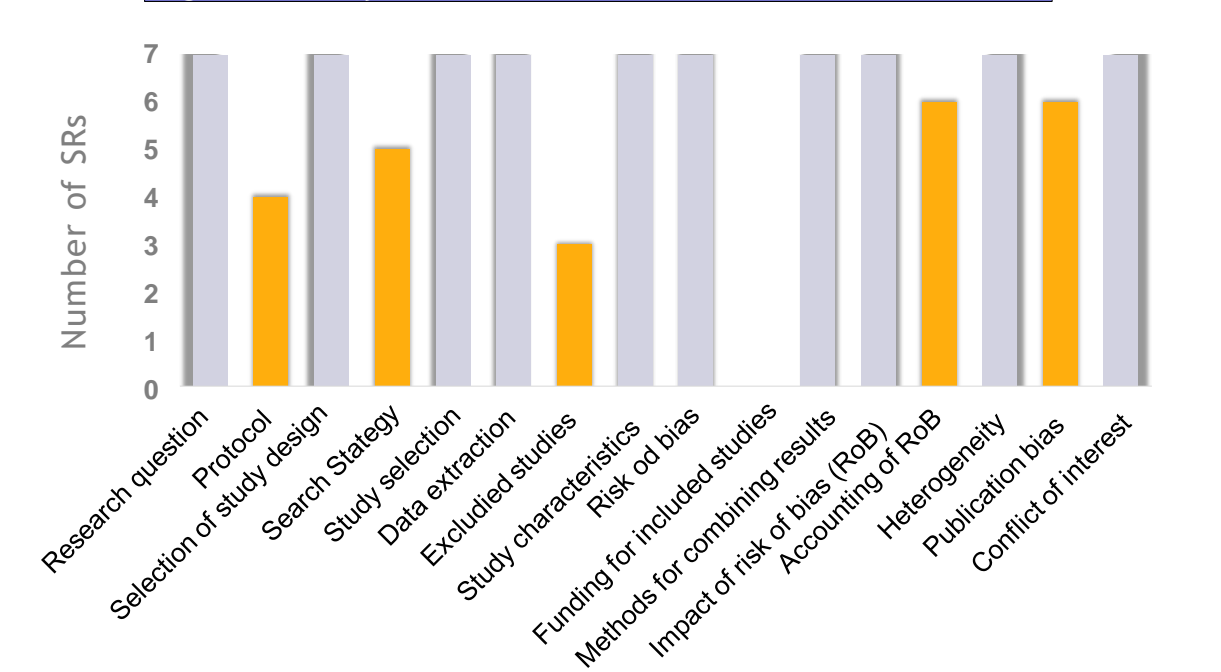
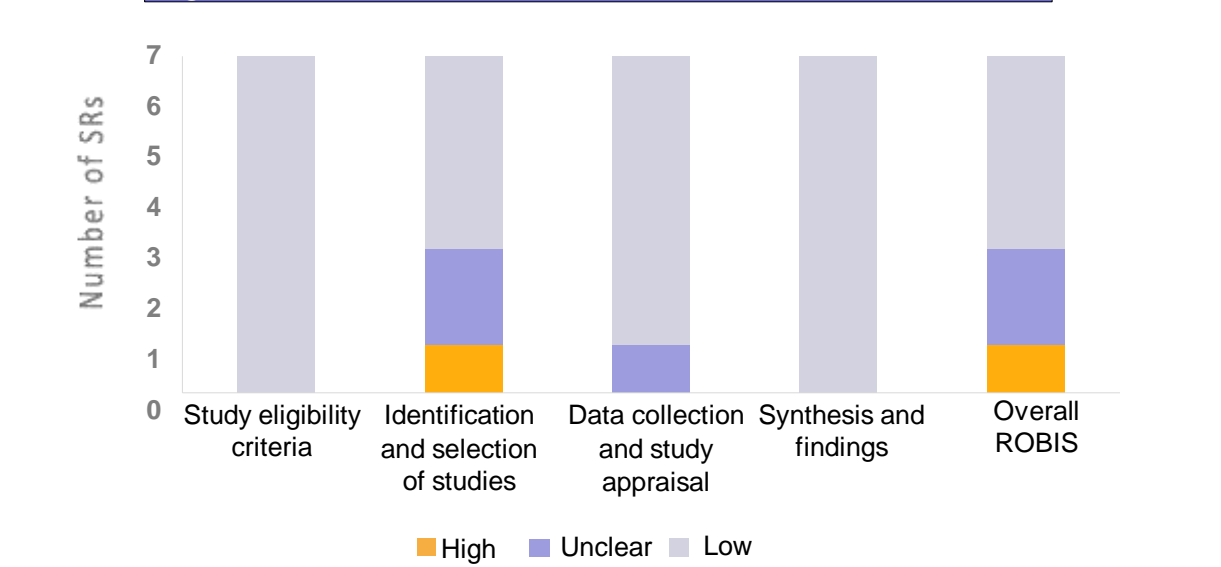


Figure 2: Risk of bias assessment of included MAs based on ROBIS



## Conclusion

- The overview of MAs indicates via limited quantity, but high quality, of evidence that caffeine is efficacious and safe for apnea
- No robust conclusions can be made regarding the comparative effectiveness and the safety of different timings and doses of the caffeine administration
- Larger and long-term trials are needed to confirm the different aspects of caffeine use in neonatal apnea

## Reference

This poster is based on publication: Alhersh E, Abushanab D, Al-Shaibi S, Al-Badriyeh D. Caffeine for the treatment of apnea in the neonatal intensive care unit: a systematic overview of meta-analyses. Pediatric Drugs 2020; 22(4): 399-408.



# Molecular Features of Triple Negative Breast Cancer Stem Cells: A gene Expression Profiling Analysis of MDA-MB-231 Cells

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## Background

Cancer has become the second major cause of death worldwide. The most common cancer present in females, is breast cancer with around 2.09 million cases in 2018. In Qatar, 1 out of 12 women will develop breast cancer sometime during their life. Triple negative breast cancer (TNBC) is the most aggressive and chemo-resistant subtype of breast tumours and expresses the highest rates of recurrence and metastasis (1). Chemoresistance has been attributed to the presence of long-lived cancer stem cells (CSCs) responsible for chemoresistance, disease relapse, and cancer cells self-renewal (2). These stem cells are controlled by dysregulated signalling pathways controlling the apoptosis proteins (2). The role and gene expression of apoptosis have not been investigated yet in TNBC cancer stem cells. We hypothesize that TNBC CSCs differentially express genes responsible for apoptosis.

## Objectives

1. To isolate and characterize CSCs feature (ALDH expression) compared to cancerous and non-cancerous human breast cells.
2. To determined the differential mRNA expression of pro-apoptotic (Caspase 3, caspase 7, caspase 8, caspase 9 and BAX) and anti-apoptotic (BCL-xl) in CSCs and non-CSCs cells.
3. To validated the mRNA data at the protein levels though measuring the expression of the apoptosis-mediated genes by Western blot analysis in CSCs and non-CSCs.
4. To determine the cellular content and nuclear localization of caspase 3, caspase 8, and caspase 9 by immunofluorescence assay.

## Methods

1. Three human breast cell lines; normal epithelial (MCF-10A), triple negative breast cancer (MDA-MB-231), and cancer stem cells were utilized as study models.
2. The CSCs were identified and characterized by Aldeflour assay (ALDH1A1+) expression.
3. Total RNA was isolated using TRIZOL method and the mRNA expression of target genes we quantified by RT-PCR.
4. Total protein was extracted from all cells by RIPA buffer and the expressions of target proteins were quantitated by Western blot analysis. The intensity of the bands were visualized by Chemiluminescence.
5. The cellular content and nuclear localization of caspases proteins were determined by immunofluorescence staining and the intensity was detected by Evos M5000 Imaging System.
6. Independent t-test statistical analysis was used to compare the fold of induction between MCF-10A and MDA-MB-231, and MDA-MB-231 and CSC separately

## Conclusion

Our results suggest that the triple negative breast cancer stem cells' chemoresistance is mainly attributed to the downregulated expression of pro-apoptotic genes and upregulated expression of anti-apoptotic markers, which make CSCs resistant to apoptosis and thus maintain their development and proliferation. This study sheds the light on the importance of targeting the dysregulated apoptotic pathway of cancer stem cells to overcome chemoresistance and prevent tumor relapse.

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## Results

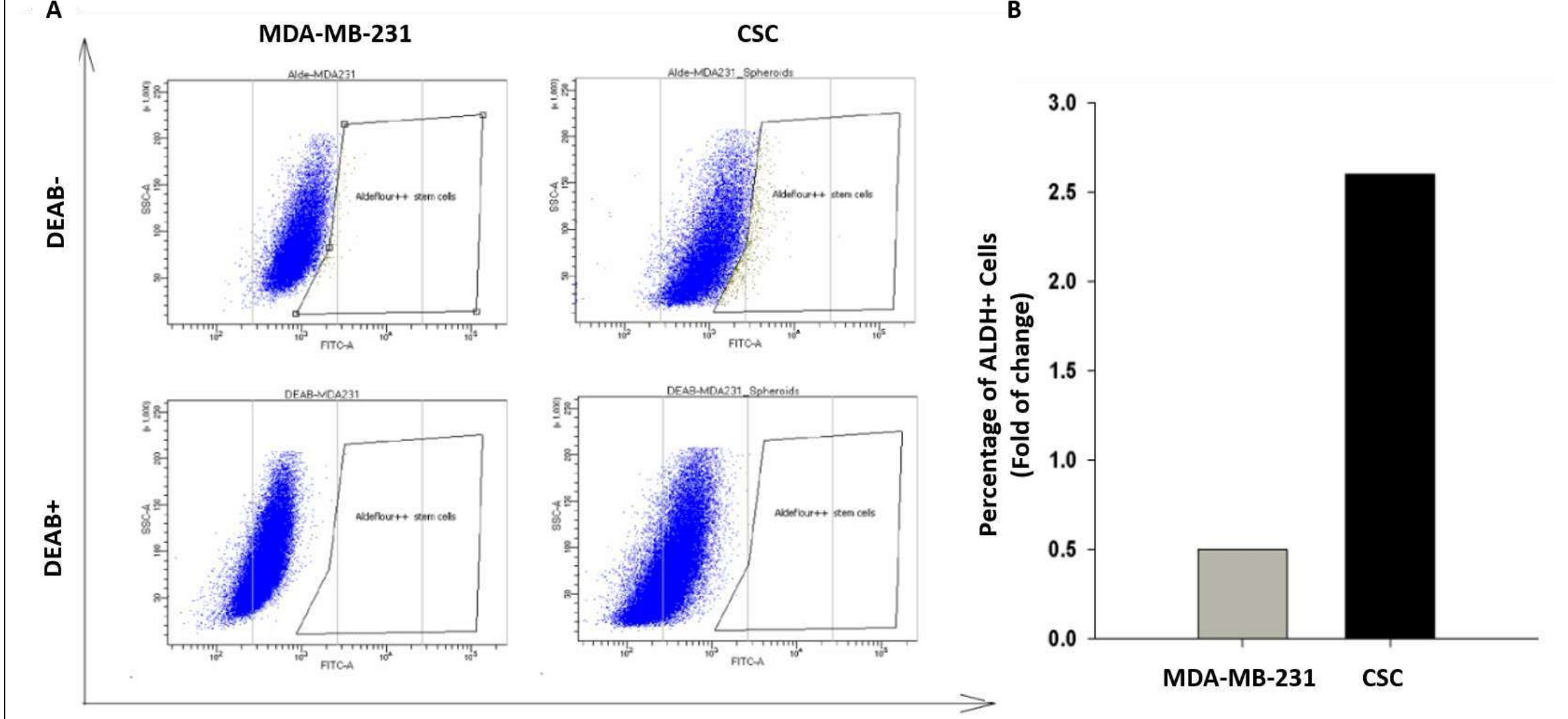


Figure 1. Constitutive expression of ALDH in cancer stem cells versus MDA-MB-231 cells by flowcytometry.

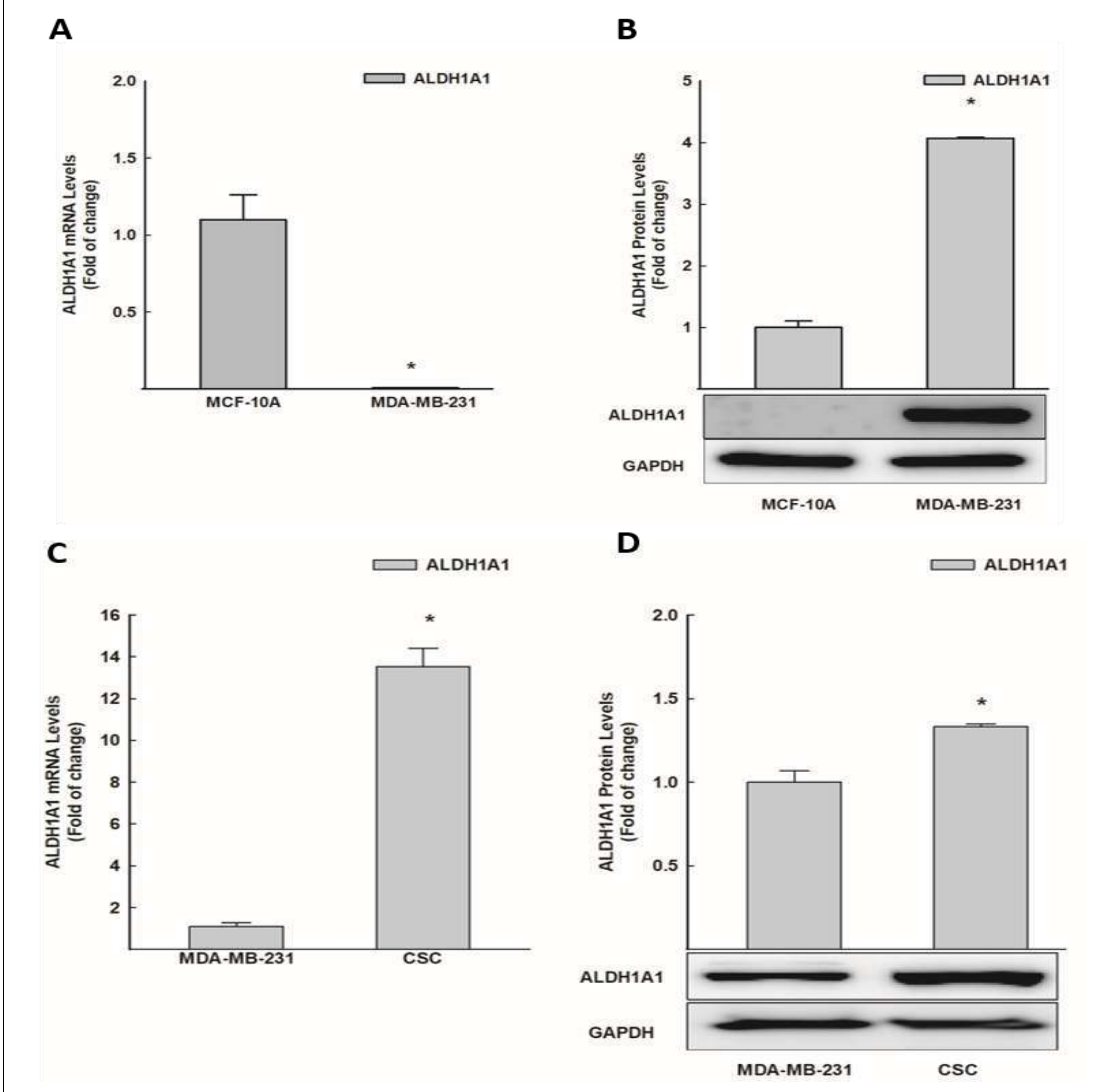


Figure 2. Constitutive expression of ALDH1A1 in MCF-10A, MDA-MB-231, and cancer stem cells.

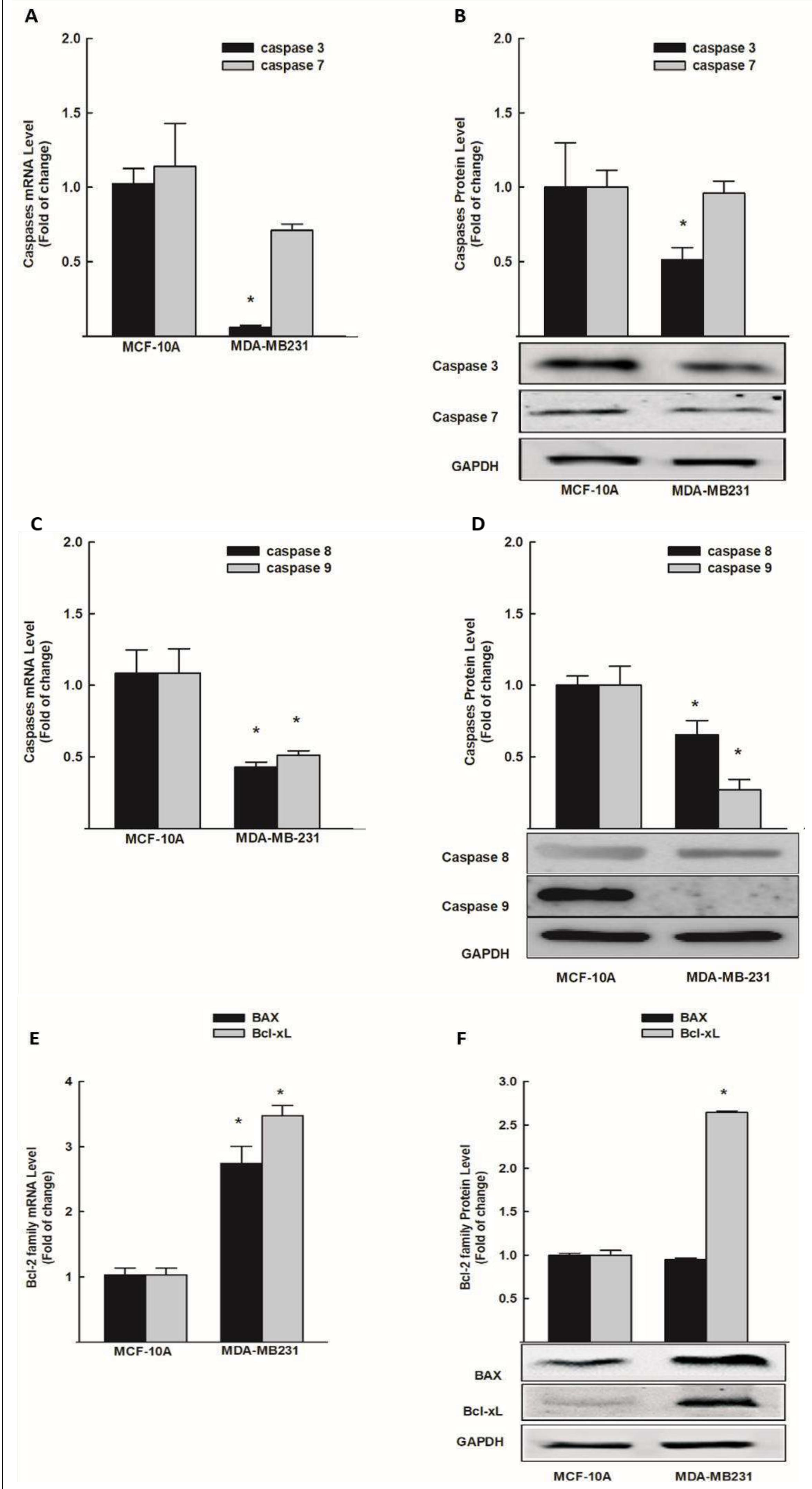


Figure 3. Constitutive expression of caspase 3, caspase 7, caspase 8, caspase 9, BAX, and Bcl-xL in cancer stem cells versus MDA-MB-231 cell line.

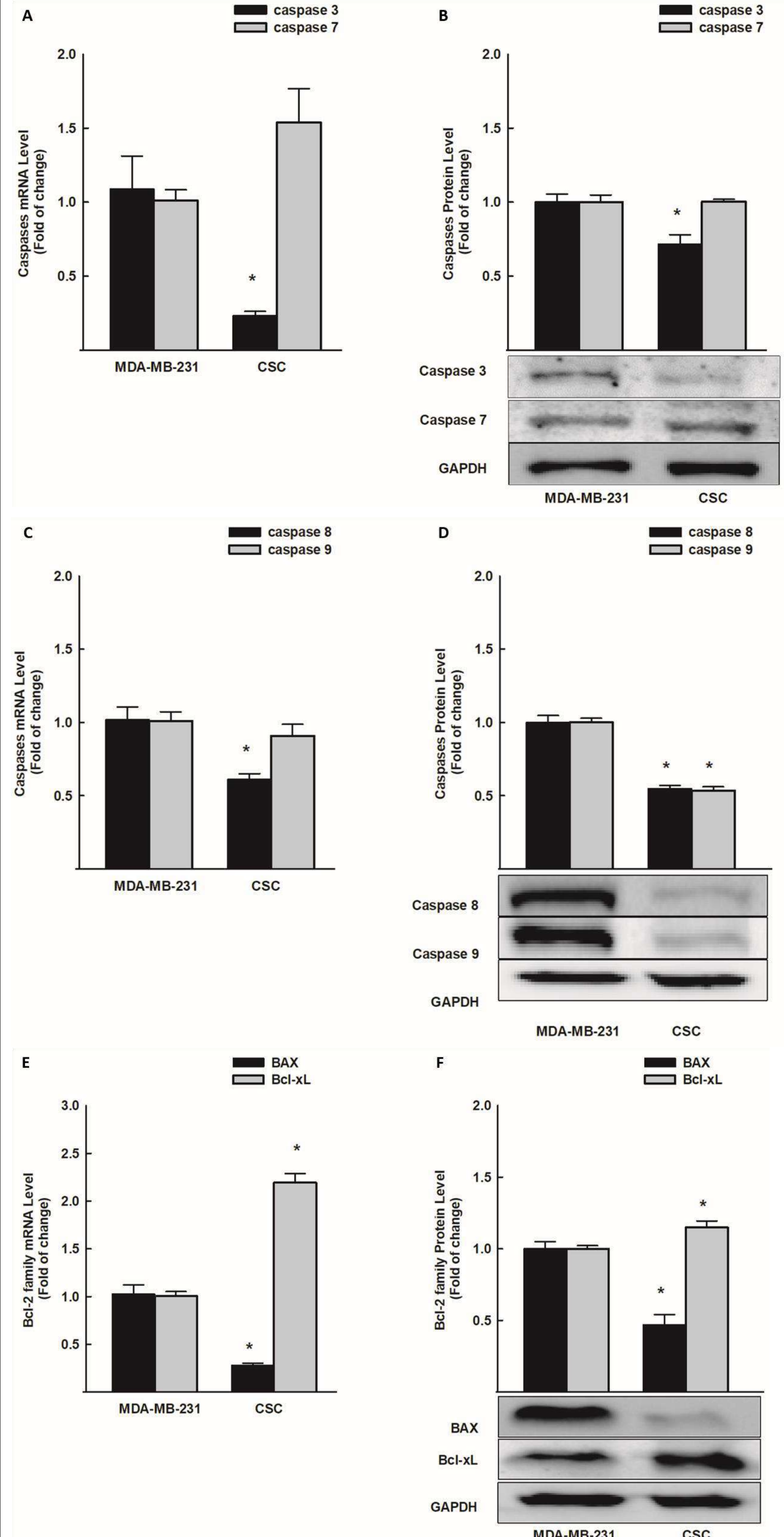


Figure 4. Constitutive expression of caspase 3, caspase 7, caspase 8, caspase 9, BAX, and Bcl-xL in cancer stem cells versus MDA-MB-231 cell line.

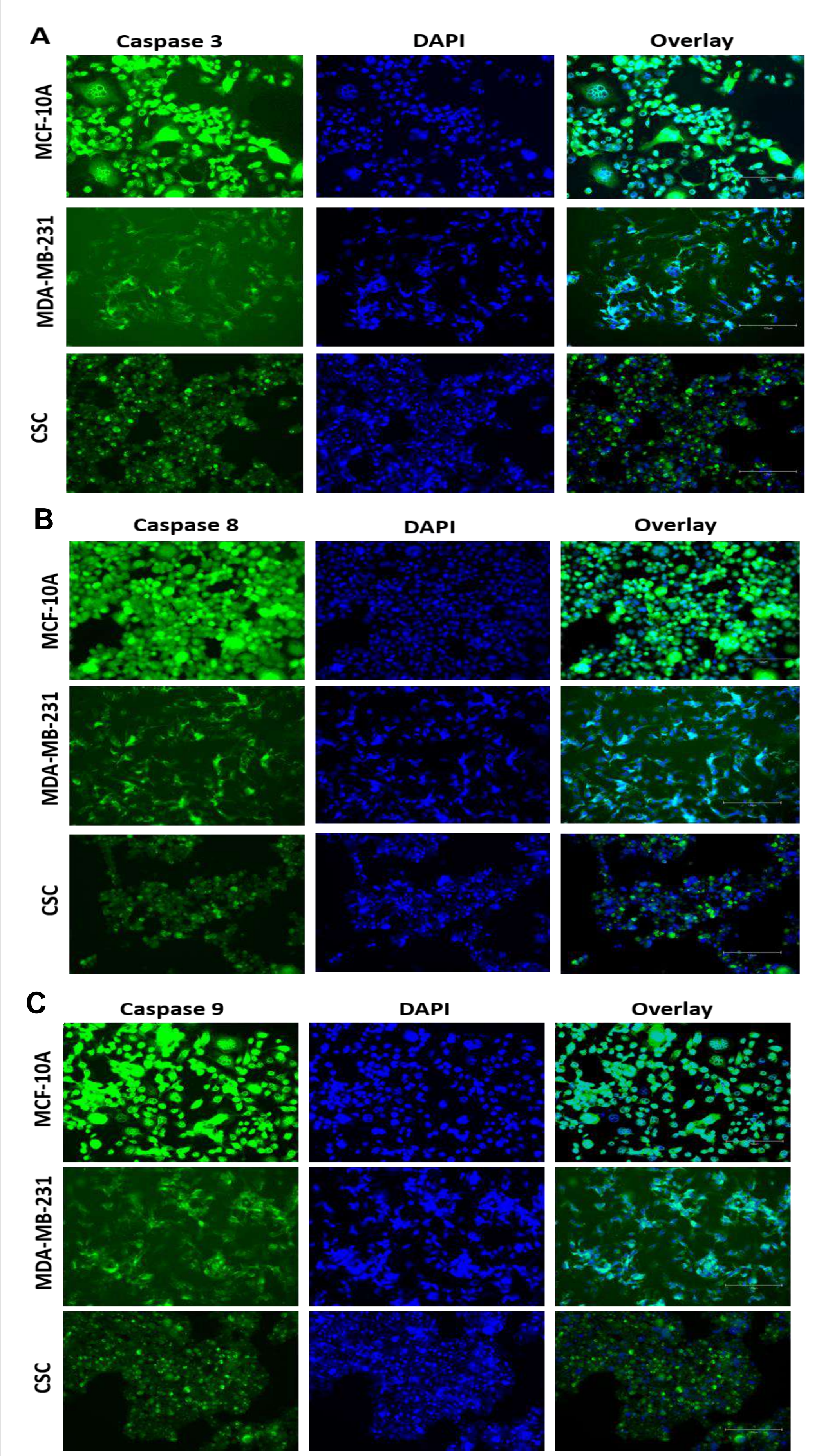


Figure 5. Basal cellular localization and expression of caspase 3, caspase 8, and caspase 9, in MCF-10A, MDA-MB-231, and cancer stem cells.

## Acknowledgments

I would like to acknowledge the work of Dr. Siveen Sivaraman in the flowcytometry at the Hamad Medical Corporation. Moreover, I would also like to thank Dr. Hanaa Mousa for her help in the immunofluorescence assay. The study was supported by QNRF grant (UREP24-163-3-049) and Qatar university grant (IRCC-2019-006).



# Modulation of the Molecular Expression and Function of BCL-2 Family Proteins by Aryl Hydrocarbon Receptor in Breast Cancer Stem Cells of the MDA-MB-231

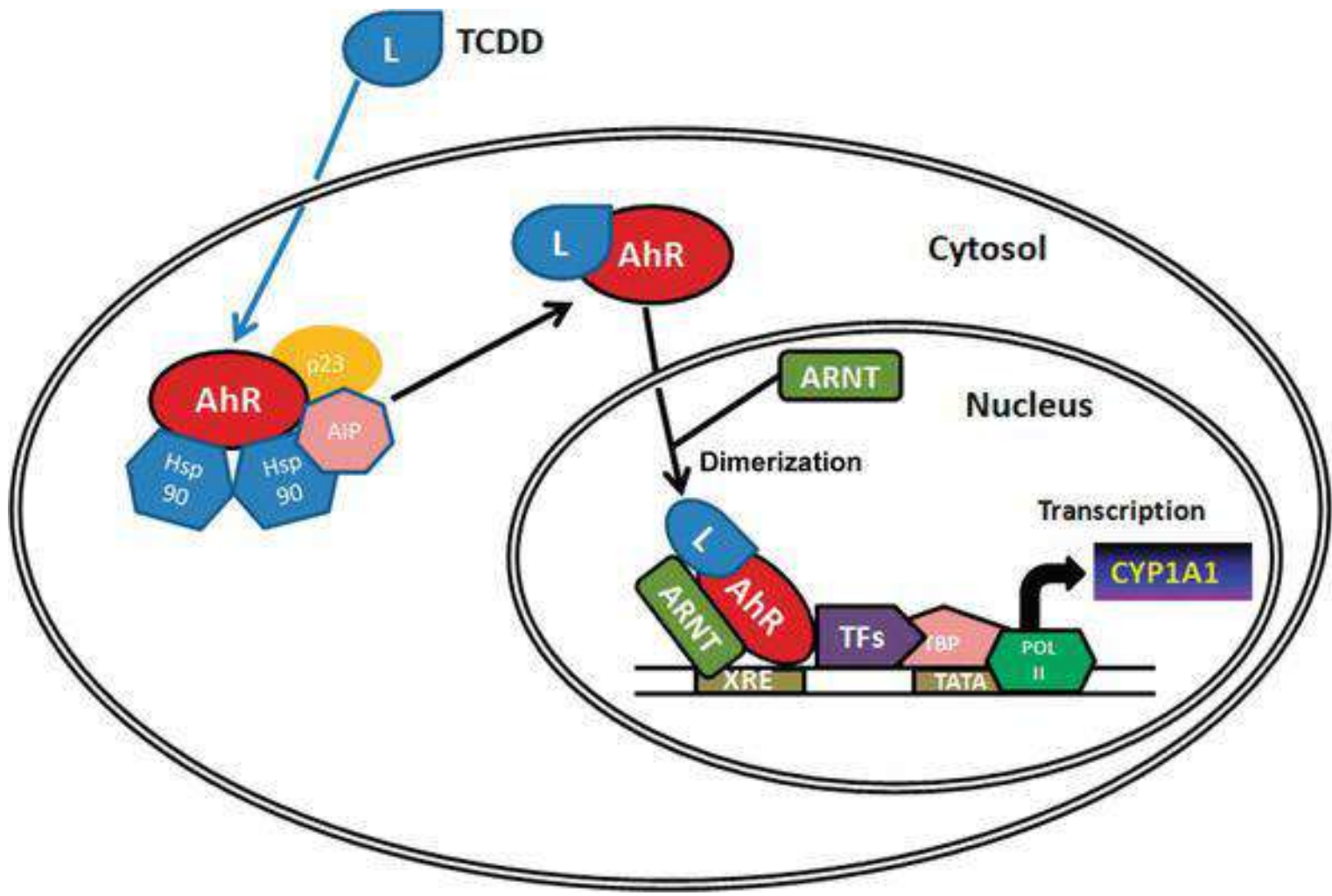
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<sup>2</sup>Translational Research Institute, Academic Health System, Hamad Medical Corporation, Doha, Qatar.

## Background

Breast cancer (BC) is one of the most serious health problems among women, both in developed and developing countries (1). Due to being metastatic, BC can travel to different organs such as lung, liver, bones and brain which makes it hard to treat. It acquires stemness by the formation of breast cancer stem cells (CSCs) which are a small subgroup of tumor inducing cells that are hard to treat because of their self-renewal properties. There are various proteins and transcription factors that are dysregulated in BC cells among which anti-apoptotic protein, B-cell lymphoma 2 (BCL-2) and aryl hydrocarbon receptor (AhR) are of paramount importance. BCL-2 is considered to be associated with aryl hydrocarbon receptor (AhR) which is a transcription factor activated upon binding to a ligand (2, 3). This association of AhR and BCL-2 has not been studied yet.



## Objectives

- To examine the basal expression levels of BCL-2 and AhR in breast cancer cells and Breast CSCs.
- To examine the effect of AhR inhibitor,  $\alpha$ -NF on the link between BCL-2 and AhR in breast cancer cells and Breast CSCs.

## Methods

- Breast cancer cell culture and mammosphere formation**
  - Human breast epithelial cell line MCF-10A and breast epithelial adenocarcinoma cell line MDA-MB-231 were cultured in DMEM.
  - MDA-MB-231 cells were cultured in ultra-low attachment 75 cm<sup>2</sup> cell culture flask provided with StemFlexTM medium for mammosphere formation.
  - The cells were grown in 75 cm<sup>2</sup> cell culture flasks in humidified incubator at 37° C and 5% carbon dioxide.
- Flow Cytometry**
  - The cells were incubated in aldeflour assay buffer, CD44 and CD24 antibodies and dye crystal violet to determine ALDH+ cells, CD44+/CD24- cells and side population through flow cytometer.
  - Extraction of proteins and western blot analysis**
  - The seeded cells were washed with cold PBS and were scraped and lysed using 50  $\mu$ l of RIPA lysis buffer.
  - These extracted proteins were analysed with Western blot analysis where 30- 60  $\mu$ g of proteins were loaded and separated using 10% of SDS-PAGE
- RNA isolation and RT-PCR**
  - The total RNA from the breast cancer cells and Breast CSCs were extracted and converted to cDNA. This cDNA was used to perform RT-PCR.
- Immunofluorescence (IF)**
  - Cells were fixed, permeabilized and incubated with specific primary and secondary antibodies.
  - Fluorescence was visualized through microscope
- Statistical analysis**
  - Student's t-tests and one-way ANOVA were performed using SigmaPlot 11.0 software and P<0.05 was considered significant.

## Acknowledgments

I would also like to thank Dr. Hanaa Mousa for her help in the immunofluorescence assay. The study was supported by Qatar university (Qatar)– University of Alberta (Canada) International Research Collaboration Co-fund grant (IRCC-2019-006).

## Results

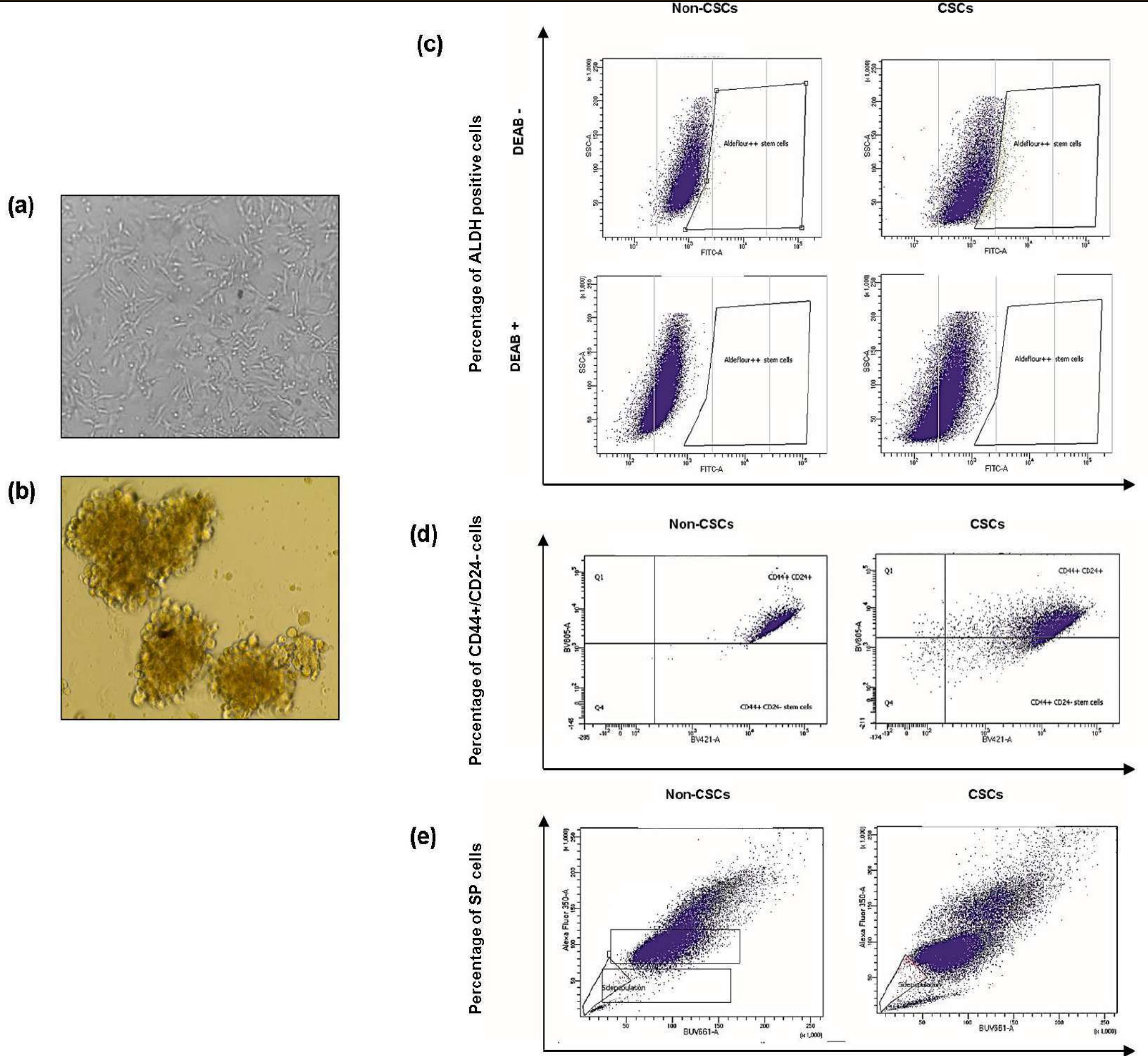


Figure 1. Enrichment of BCSCs through mammosphere formation and characterisation of ALDH+, CD44+ CD24-/low and SP cells.

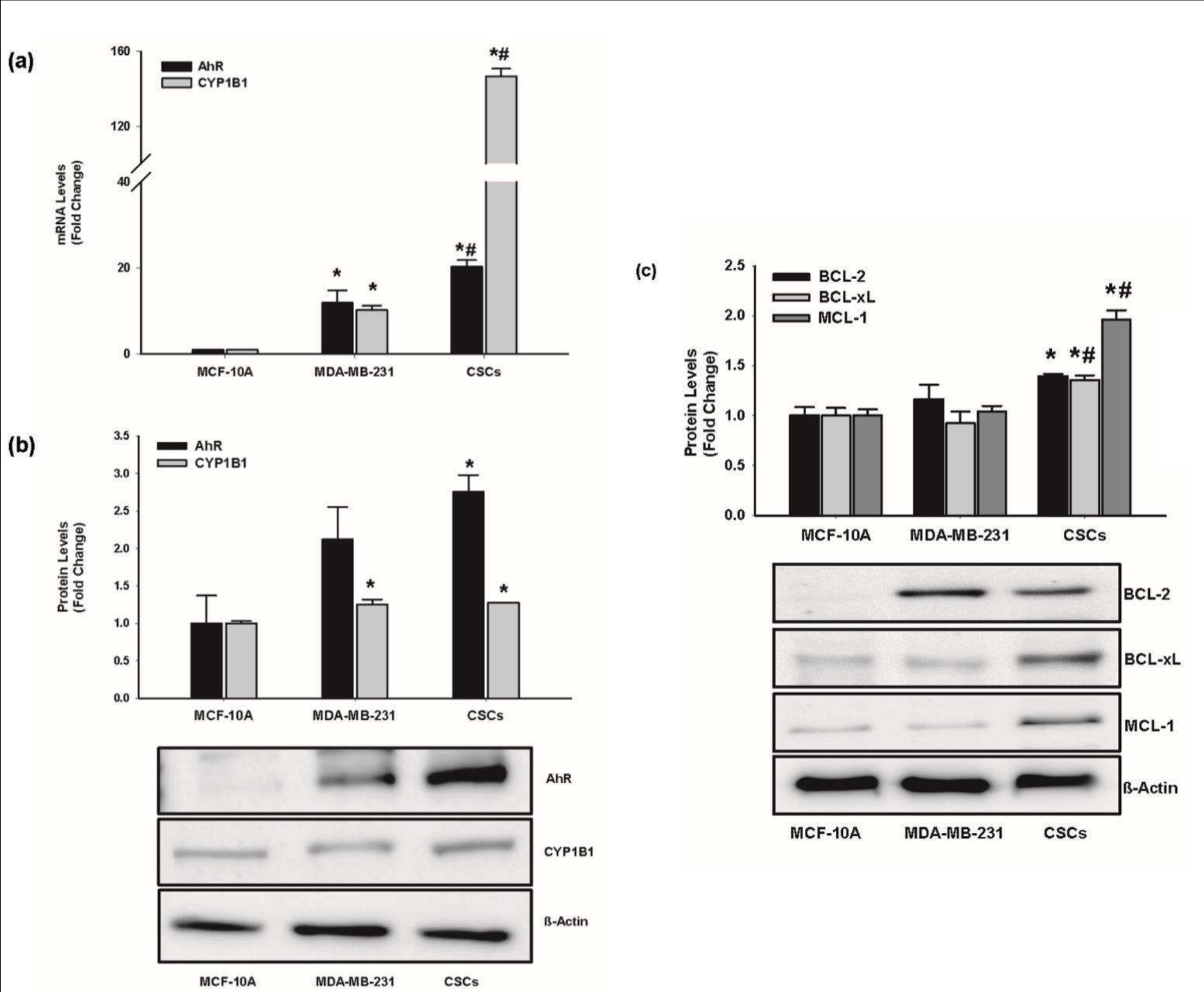


Figure 2. Constitutive expression of AhR, CYP1B1 and BCL-2 proteins in non-cancer cells, cancer cells and Breast CSCs.

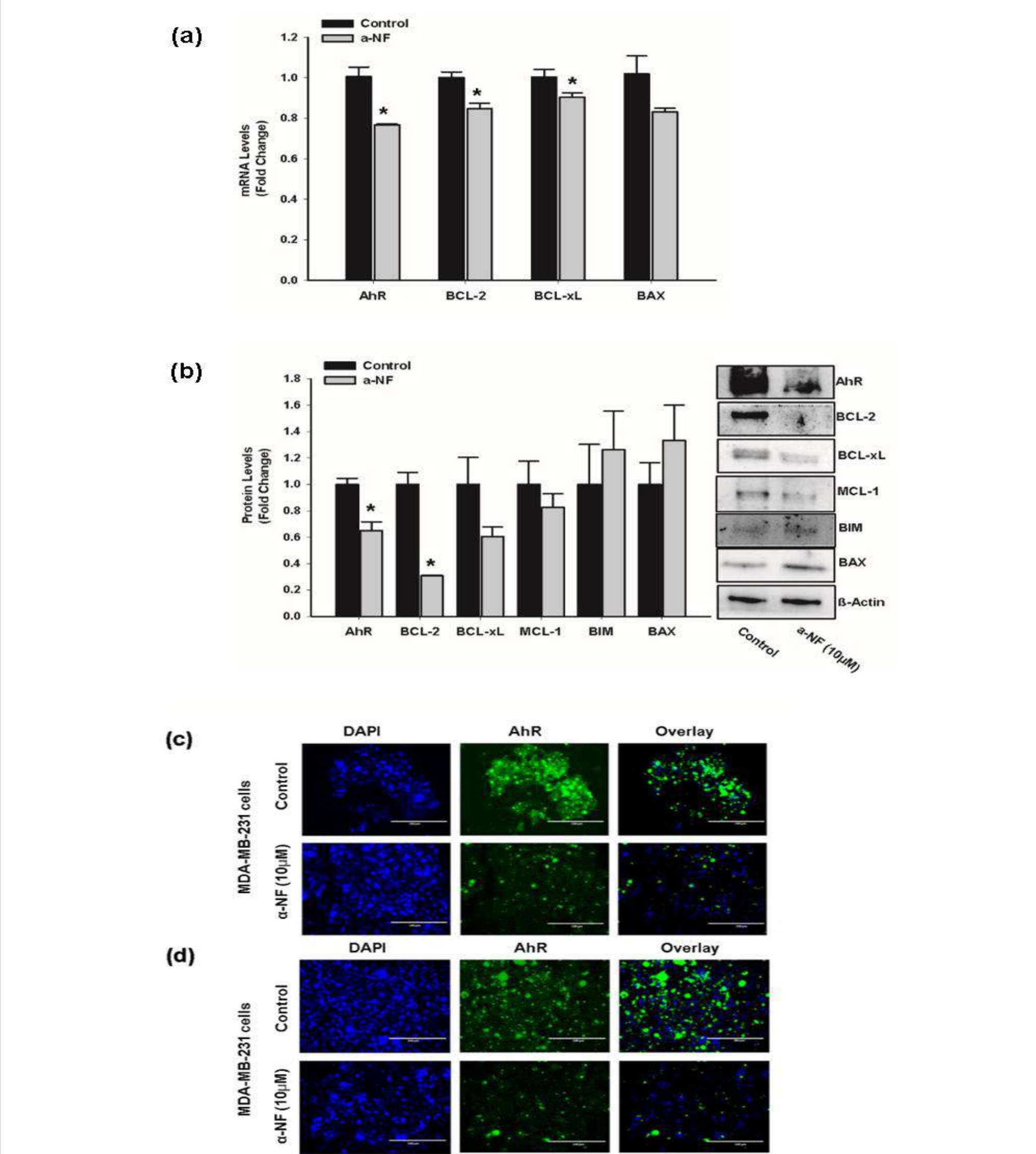


Figure 3. Effect of AhR inhibition on BCL-2 family proteins in Breast CSCs.

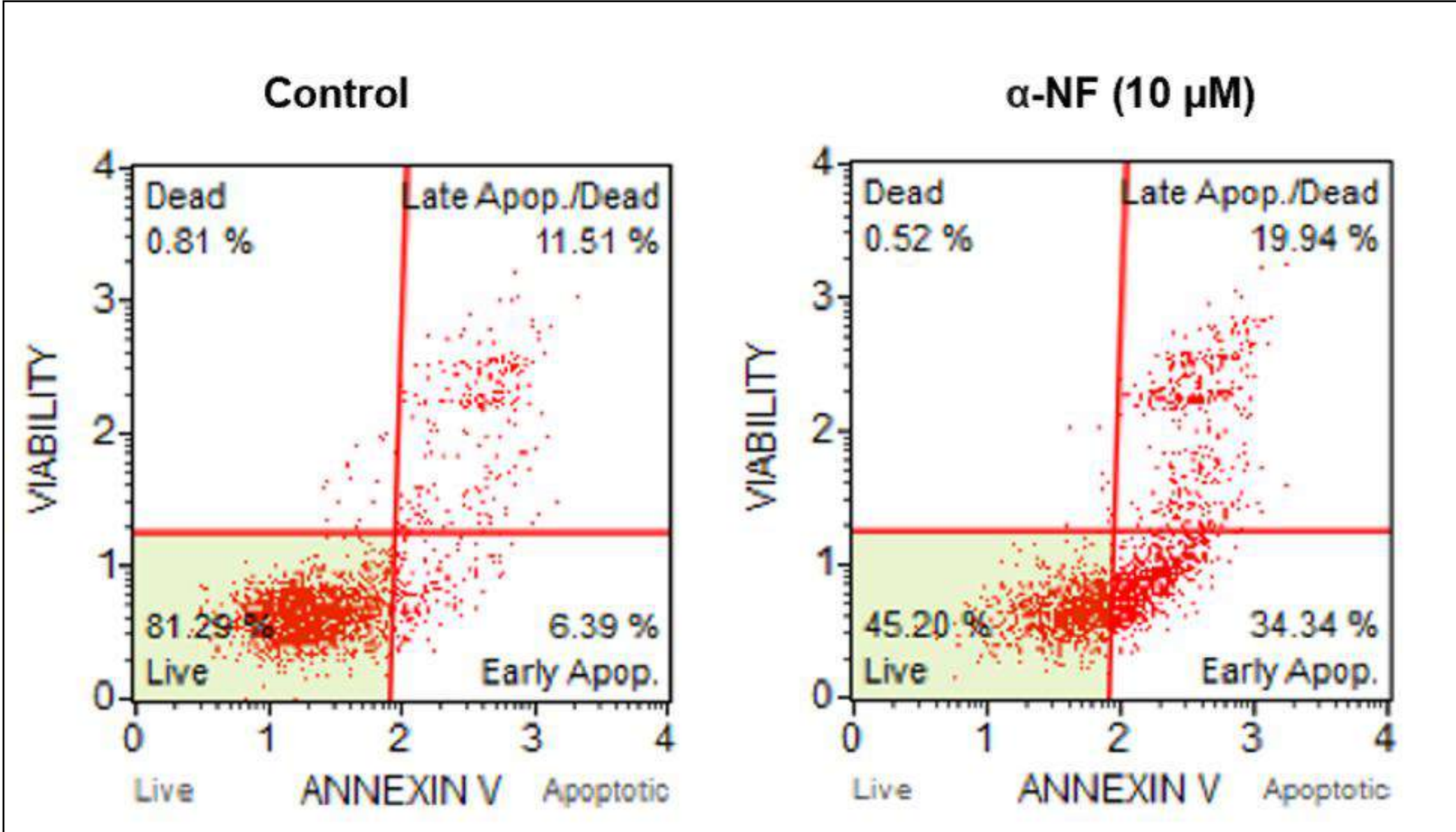


Figure 4. Effect of AhR inhibition on apoptosis in BC cells.

## Results

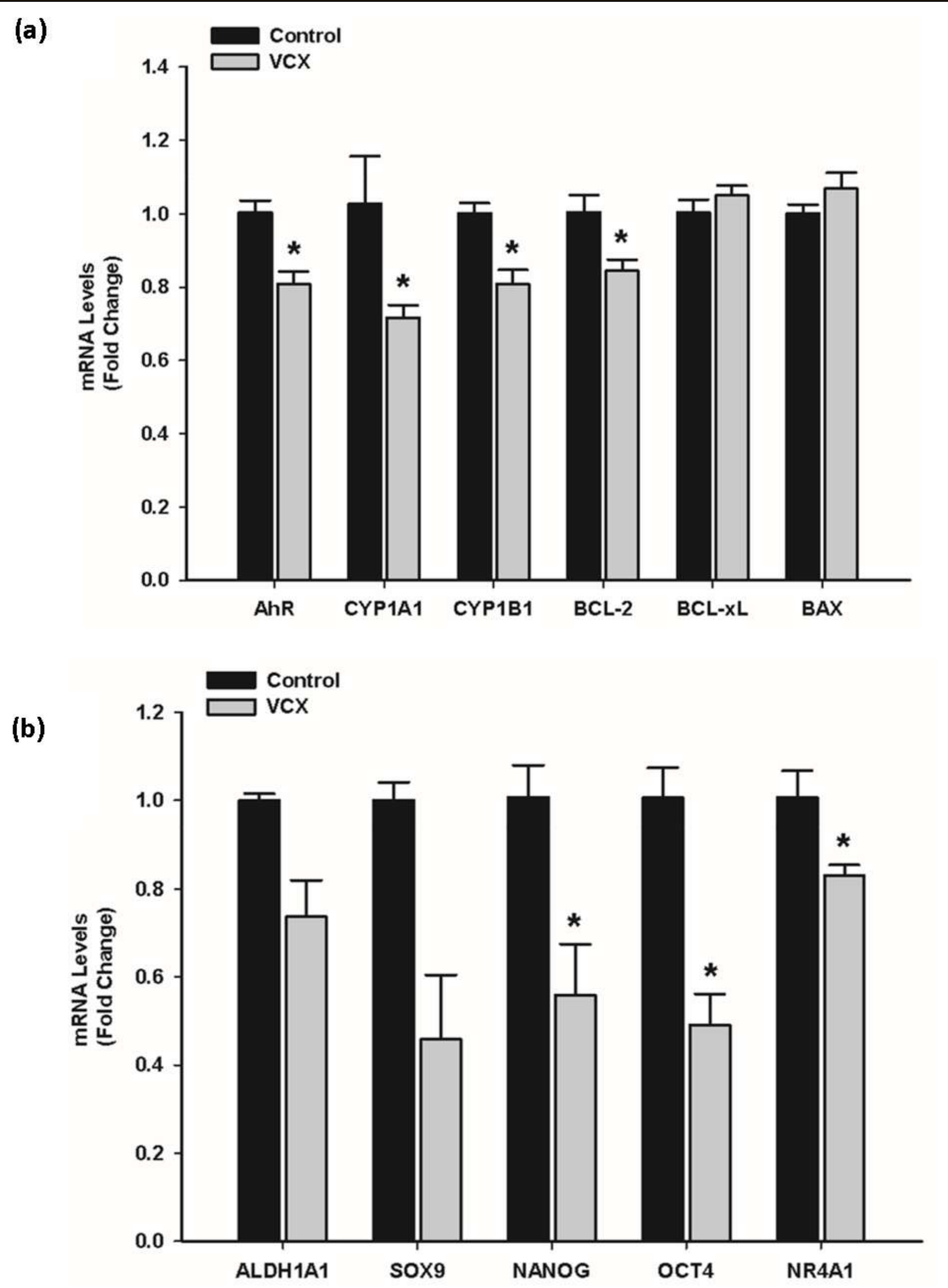


Figure 5. Effect of BCL-2 on AhR and its regulated genes and also on CSC markers.

## Discussion

- The mammospheres contained more ALDH+, CD44+ CD24-/low and SP cells compared to adherent MDA-MB-231 cell and it has been previously found that a higher ratio of CD44<sup>high</sup>/CD24<sup>low</sup> in mammospheres of MDA-MB-231 cells (4) and higher levels of ALDH+ and CD44<sup>high</sup>/CD24<sup>low</sup> cells in BC are associated with metastasis, chemoresistance and high recurrence rate
- The increased expression of CYP1B1 in breast CSCs in the current study is aligned with the previous studies showed that CYP1B1 expression is associated with high grade tumor (grade III and IV) and increased chemoresistance of ovarian (5) and renal (6) cancers, suggesting that increased CYP1B1 expression in our CSCs could mediate chemoresistance.
- The  $\alpha$ -NF induced downregulation of BCL-2 in CSCs can also be explained by the findings that AhR antagonist increases basic fibroblast growth factor-2 (FGF-2) in drug resistant MCF-7 cells which eventually decreases BCL-2 levels, induces apoptosis and reduces cancer progenitor population (7).
- High expression of BCL-2 has been implicated in development of chemoresistant cells and these cells possess characteristics of CSCs. Song and co-workers reported that in gastro-oesophageal cancer, downregulation of BCL-2 through AT101 resulted in reduction of CSC markers, YAP1/SOX9 (8).

## Conclusion

The current study provides the first evidence of the crosstalk between AhR and BCL-2 for development of Breast CSCs. The results are highly significant in the field of identifying molecular targets for the treatment of CSCs.

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# ANTICANCER ACTIVITY OF NEOSETOPHOMONE-B, AN AQUATIC FUNGAL SECONDARY METABOLITE, AGAINST LEUKEMIC CELL LINES

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## Background

Cancer, one of the worlds serious health problem and is one of the prime cause for millions of death, and the incidence rate is increasing day by day. Chemotherapy, radiation, surgery are some of the standard therapeutic strategies for curing cancer. But this has been hindered due to some drawbacks related to poor water solubility and bioavailability of drugs, leading to up regulation of multi drug resistance and adverse side effects, natural products are used as an alternative form for the treatment of cancer. Aquatic fungi represent a rich and important source of anticancer agents and the secondary metabolites produced by these fungi have been used in wide range of applications. In this study we would like to investigate whether aquatic fungal secondary metabolite Neosetophomone B (NSP-B) has ability to control the proliferation and induce apoptosis in leukemic cell lines, K562 and U937.

## Study Objective

- To establish whether Neosetophomone B mediated inhibition in cell viability is due to cell cycle arrest/ apoptosis in leukemic cells.
- To investigate whether cell apoptosis is mediated via intrinsic or extrinsic pathway.
- To evaluate the effects of Neosetophomone-B on anti-apoptotic genes.

## Materials and Methods

- Cell culture: K562 and U937 cell lines were cultured in RPMI 1640 medium supplemented with 10 % (v/v) fetal bovine serum (FBS), 100U/ml penicillin, 100U/ml streptomycin at 37° C in a humidified atmosphere containing 5 % CO<sub>2</sub>.
- Cell Proliferation Assay: K562 and U937 cell lines were treated with increasing doses of Neosetophomone-B for 48 hours and analyzed using CCK-8 assay to identify dose-dependency of Neosetophomone-B and IC<sub>50</sub>.
- Apoptosis: Fluorescent Annexin V and Dead assay apoptosis detection assay was performed via Muse flow cytometry.
- Mitopotential assay: 1x10<sup>6</sup> cells were treated with different doses of Neosetophomone-B for 48 hours and mitopotential measured by Muse flow cytometry.
- DNA Laddering: DNA were isolated from the cells treated with different doses of Neosetophomone-B and run in agarose gel electrophoresis and view under chemiDOC imaging system.
- Western blot: K562 and U937 cells were treated with Neosetophomone-B for 48 hours, lysed and proteins were isolated. Equal amounts of protein were separated by SDS-PAGE, transferred to PVDF membranes and probed with specific antibodies.

## Results

- Cell Proliferation Assay: NSP-B treatment on K562 and U937 cells cause a dose dependent Inhibition of cell viability was measured using Cell counting Kit-8. (Figure 1).
- Annexin V staining: NSP-B treatment induced apoptosis in leukemic cells and measured using Annexin V staining.(Figure 2).
- Immunoblotting Techniques: NSP-B induces the activation of both intrinsic and extrinsic apoptotic pathways. (Figure 3).
- DNA laddering Assay: NSP-B induces apoptosis in K562 and U937 cell lines by detecting the DNA fragments ,which further confirmed by probing with p-H2AX antibody, hallmark of DNA double strand break.(Figure 4).
- Measurement of Mitochondrial Membrane potential: NSP-B treatment on leukemic cells leads to loss of mitochondrial membrane potential.(Figure 5).
- Schematic representation of mode of action of NSP-B ( Figure 6).

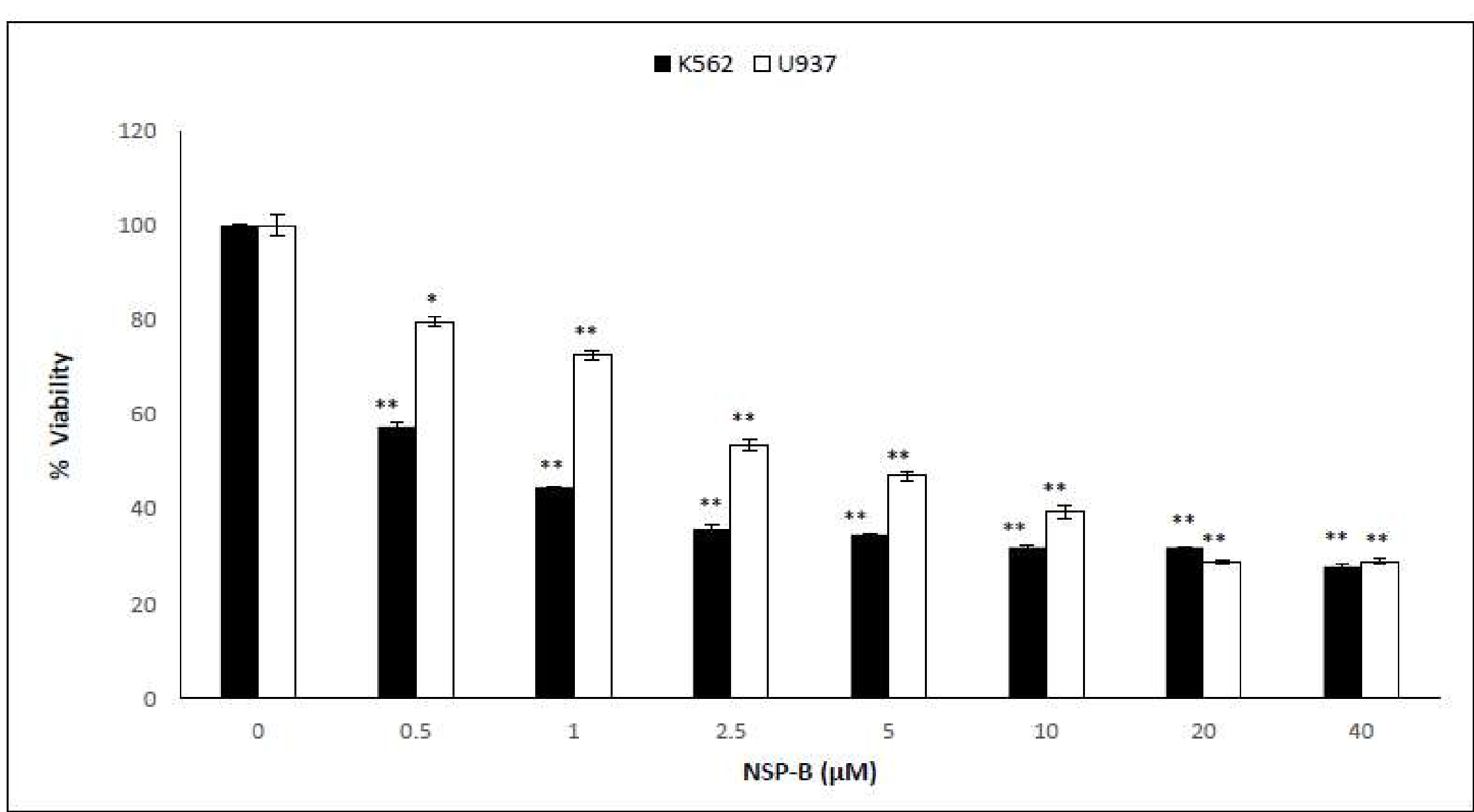


Figure 1:Treatment of NSP-B on leukemic cell inhibits the cell viability .

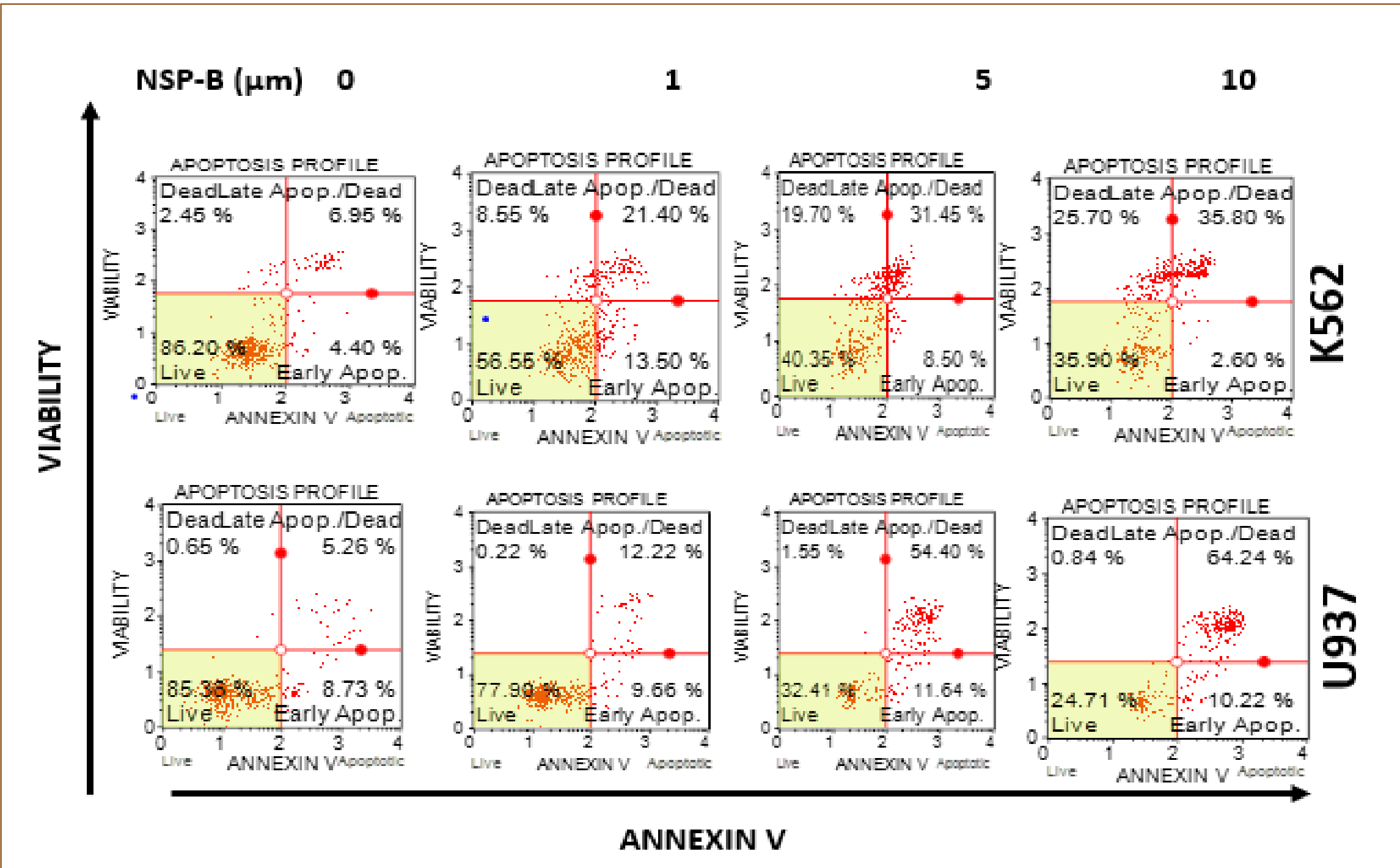


Figure 2:Neosetophomone-B induces apoptosis in K562 and U937 cell lines.

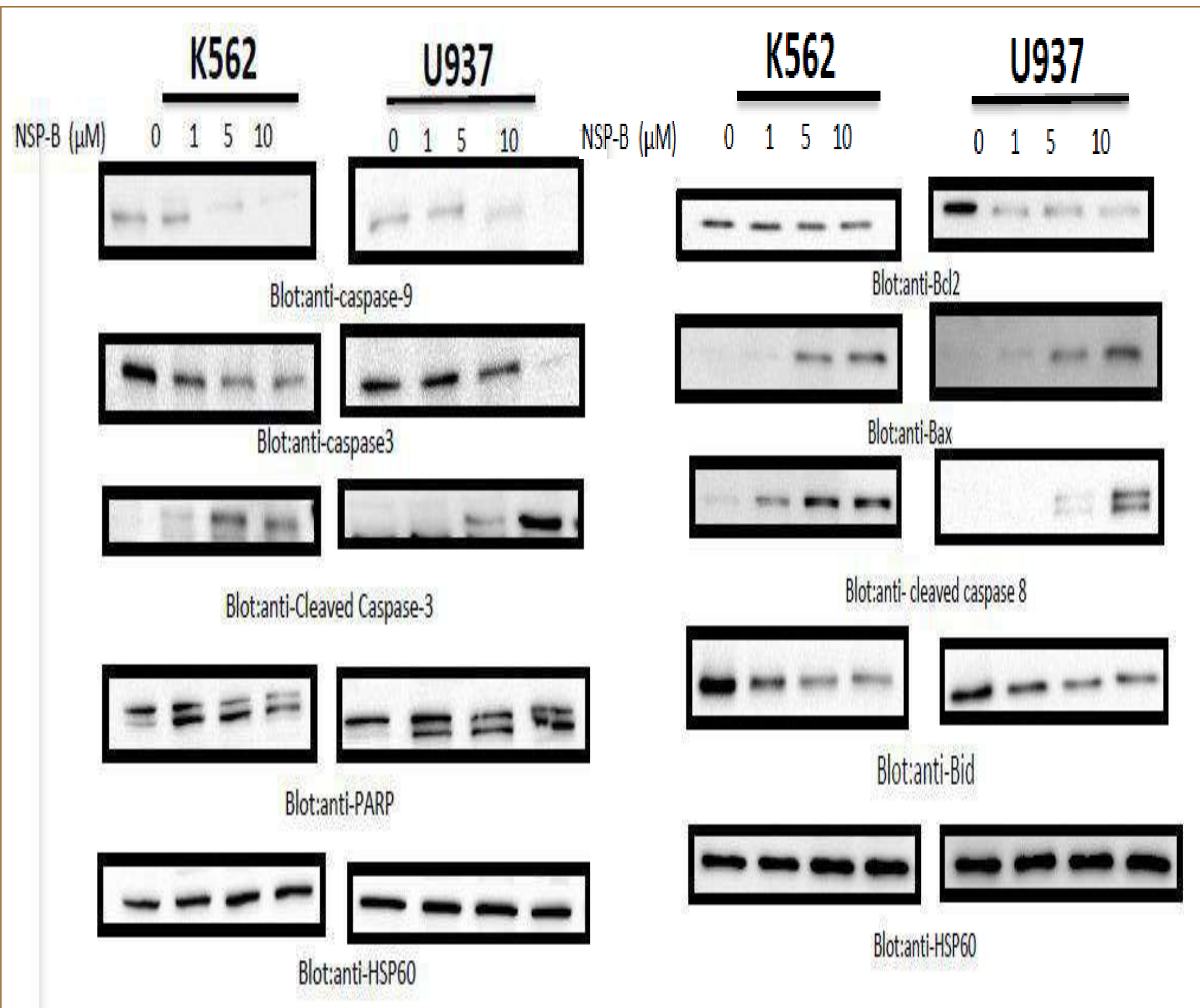


Figure 3:Neosetophomone-B induces both intrinsic and extrinsic apoptotic pathways in K562 and U937 cell lines

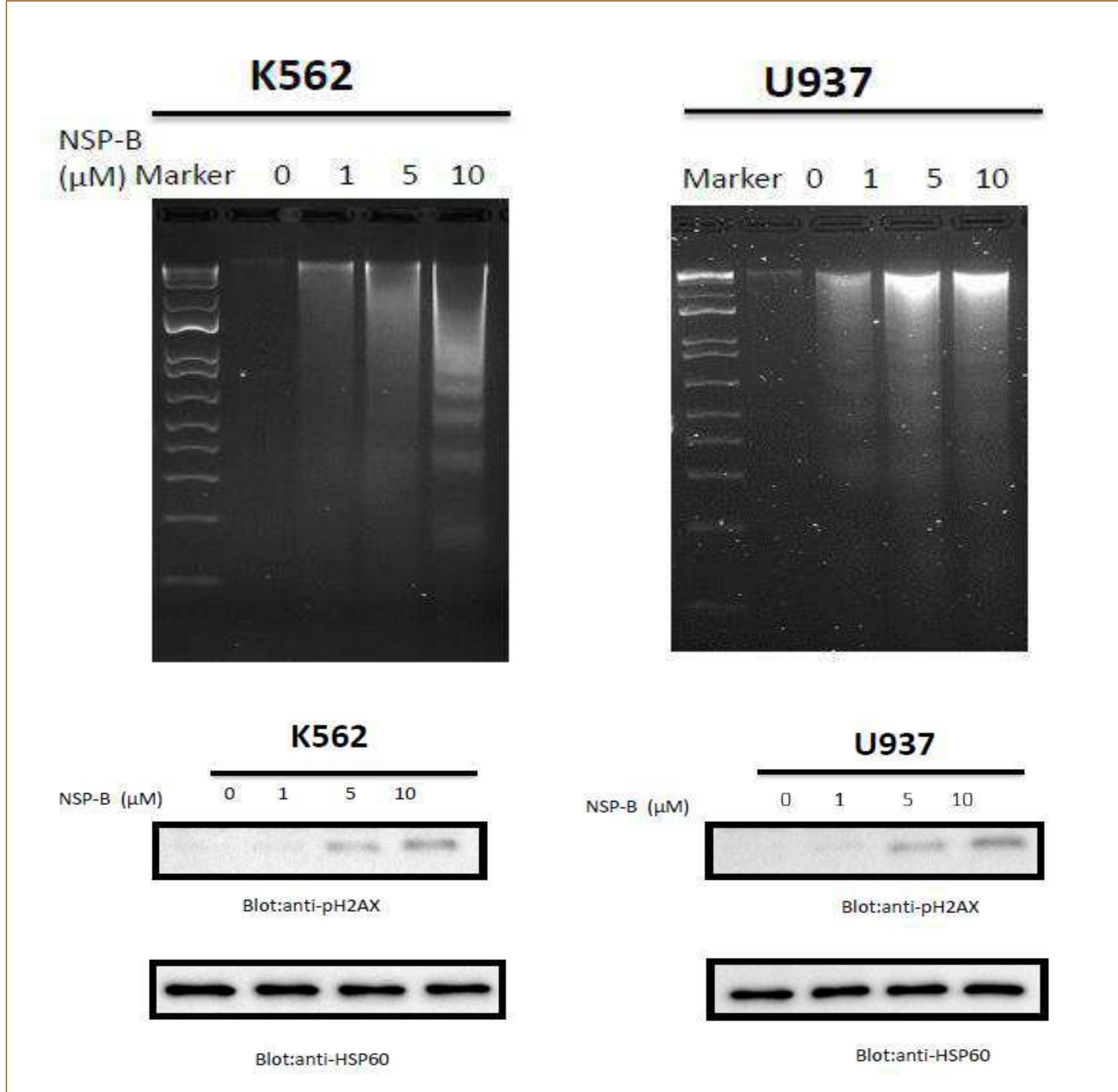


Figure 4:Neosetophomone-B induces apoptosis in K562 and U937 cell lines. Further confirmed by western blotting

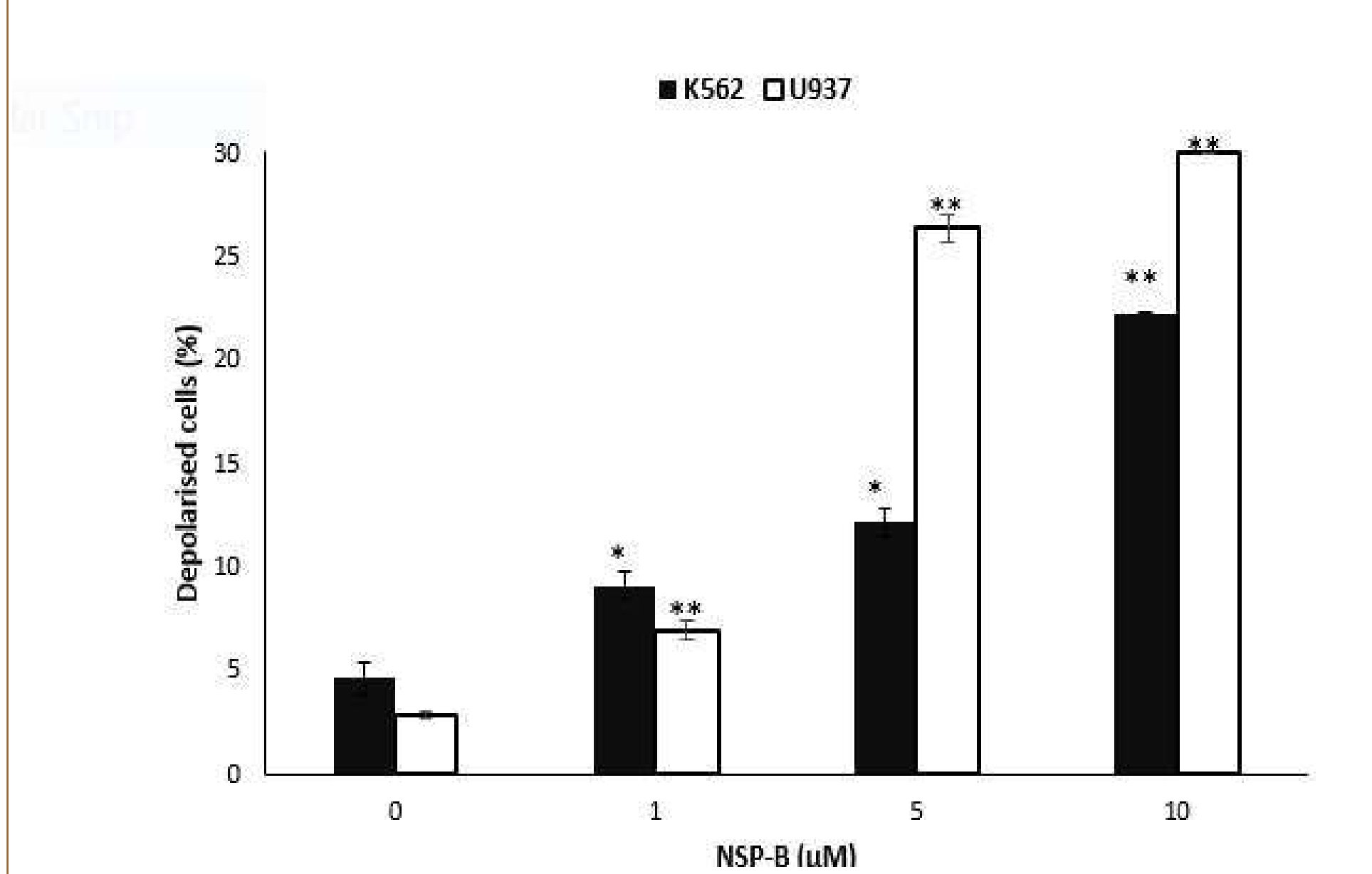


Figure 5:Treatment of NSP-B causes loss of mitochondrial membrane potential in leukemic cell lines

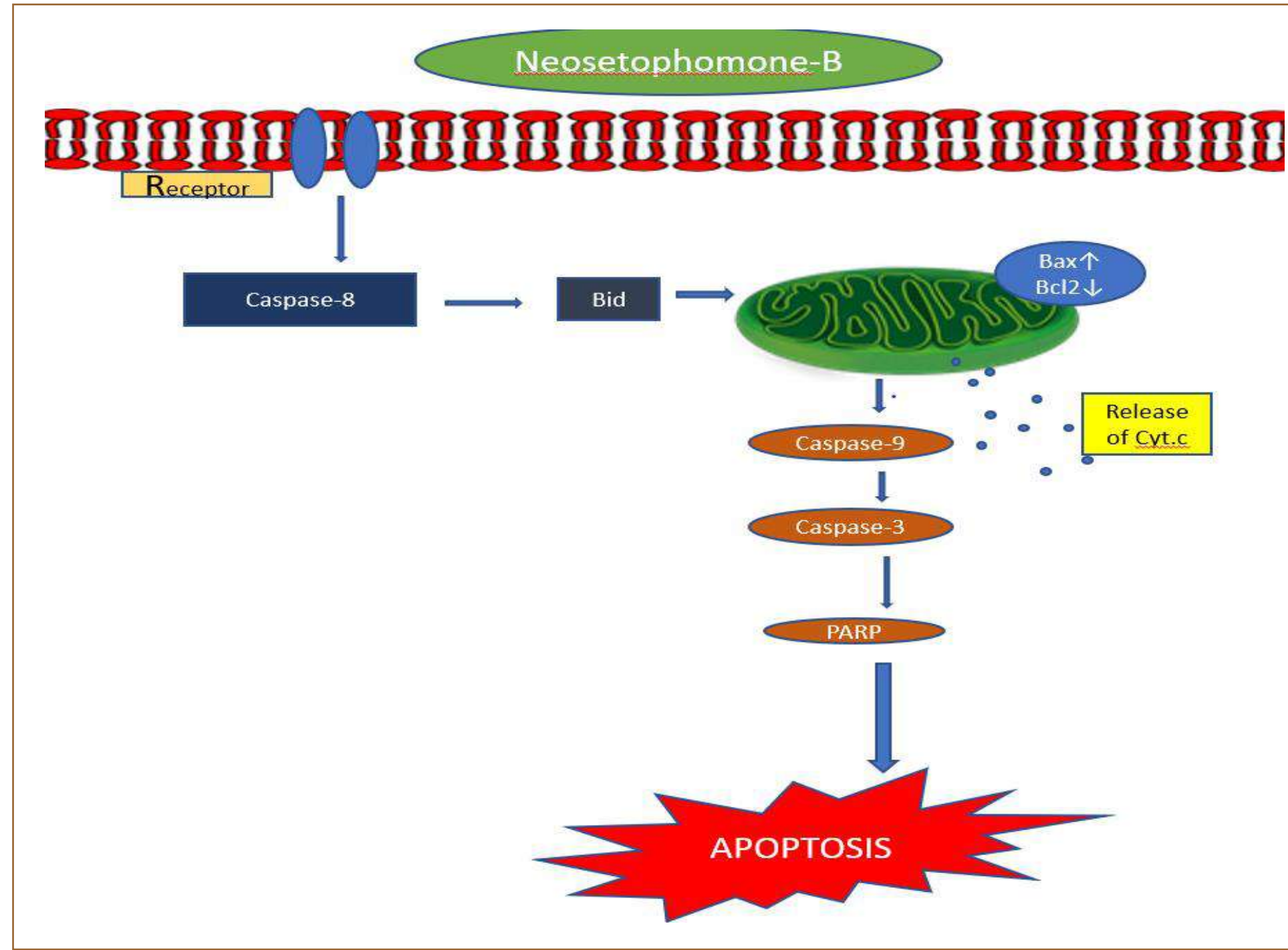


Figure 6:Schematic representation of mode of action of NSP-B.

## Conclusions

- In this study, our results showed that NSP-B induced a dose-dependent cytotoxic effects in K562 and U937 cell lines .
- Our data showed an increased Annexin/PI staining supporting that NSP-B-mediated cytotoxic effects are due to induction of apoptosis.
- Western blotting confirmed that NSP-B can induced apoptosis via intrinsic and extrinsic pathway.
- DNA laddering results confirmed that NSP-B induced apoptosis by detecting the DNA fragments, which further confirmed by immunoblotted with P-H2AX, hallmark of DNA double strand break
- Loss of Mitochondrial Membrane potential confirmed that NSP-B induced apoptosis.
- Taken together, above results suggest that NSP-B may have a future therapeutic role in Leukemia and possibly other malignancies.

## Limitations

- Ensuring enough supply of the compound as it is a pure natural compound with no other source and the isolation of the compound is a tedious process.
- Study was done only on the two leukemic cell lines, because of the time limit.
- Due to the current Covid-19 situation, some of the experiments are pending and kept for future studies.

## Future Directions

- To investigate whether Neosetophomone-B can generate reactive oxygen species which subsequently triggers cell death.
- To investigate the genes or signature of genes involved in Neosetophomone B mediated anticancer effect by using Human Gene Chip assay and data analyzed by bioinformatics.
- To investigate whether co-treatment of Neosetophomone B with chemotherapeutic conventional drug will be able to cause apoptosis in a panel of cell lines.



# The Role of Aryl Hydrocarbon Receptor Activation in Ovarian Cancer Development and Chemoresistance

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## Background

Ovarian cancer is the most lethal form of all gynecological malignancies globally<sup>1</sup>. It is one among the top 5 most frequent cancers diagnosed in women in Qatar. Ovarian cancer is characterized by poor prognosis, poor survival rate and recurrence rate of up to 75%. Environmental factors play a major role in ovarian cancer initiation- eg. exposure to environmental toxicants like TCDD.

Chemoresistance followed by tumor recurrence are major causes of poor survival rates of ovarian cancer patients and is highly correlated to the existence of Cancer Stem Cells (CSCs). Recent studies have shown a link between CSCs development and exposure to environmental toxins like TCDD. One of the pathways that mediate the metabolism and bio activation of environmental chemicals is the aryl hydrocarbon receptor (AhR) pathway. AhR is a cytosolic ligand-activated transcriptional factor involved in the regulation of cell differentiation, proliferation, and cancer imitation.

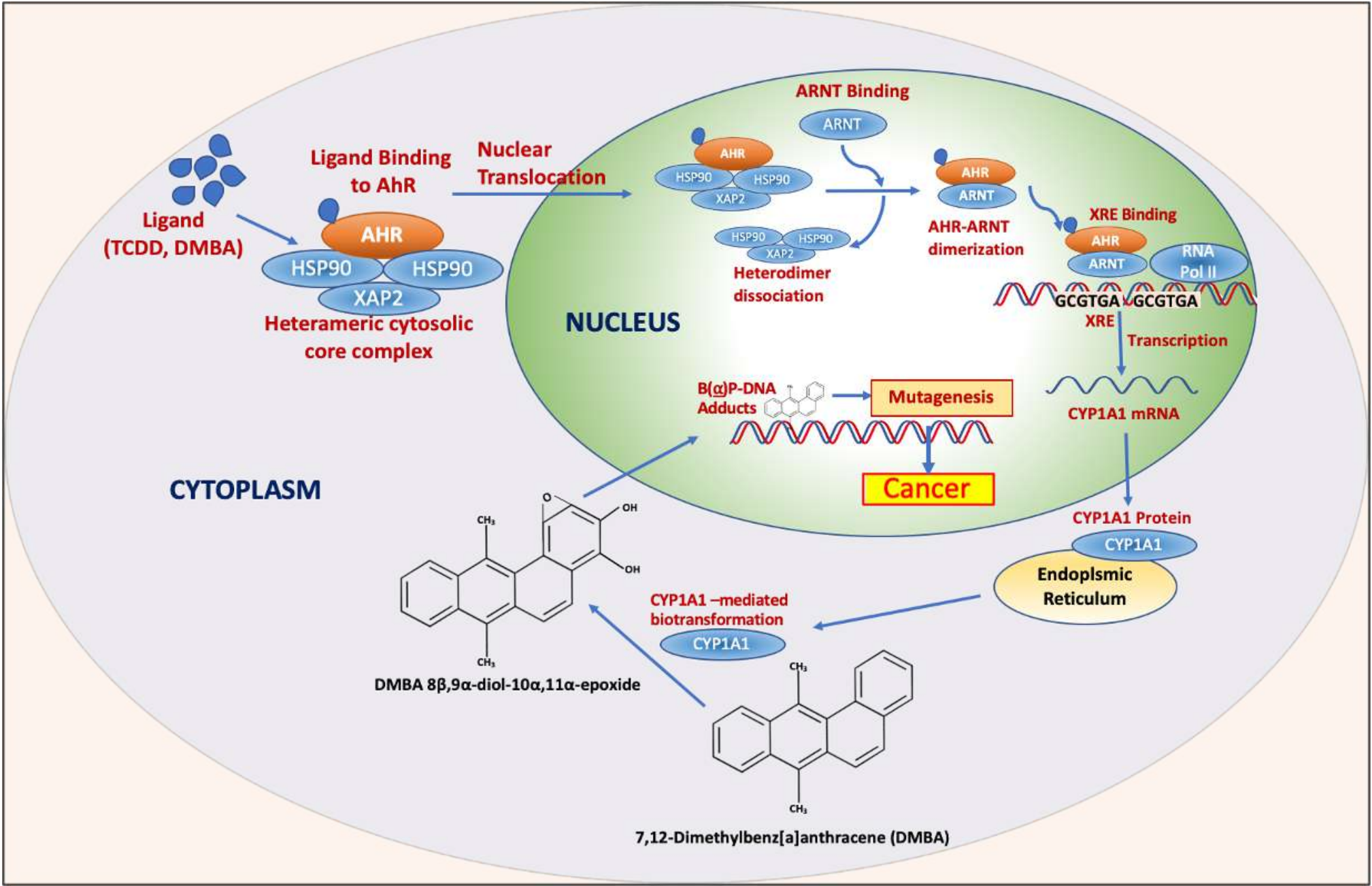


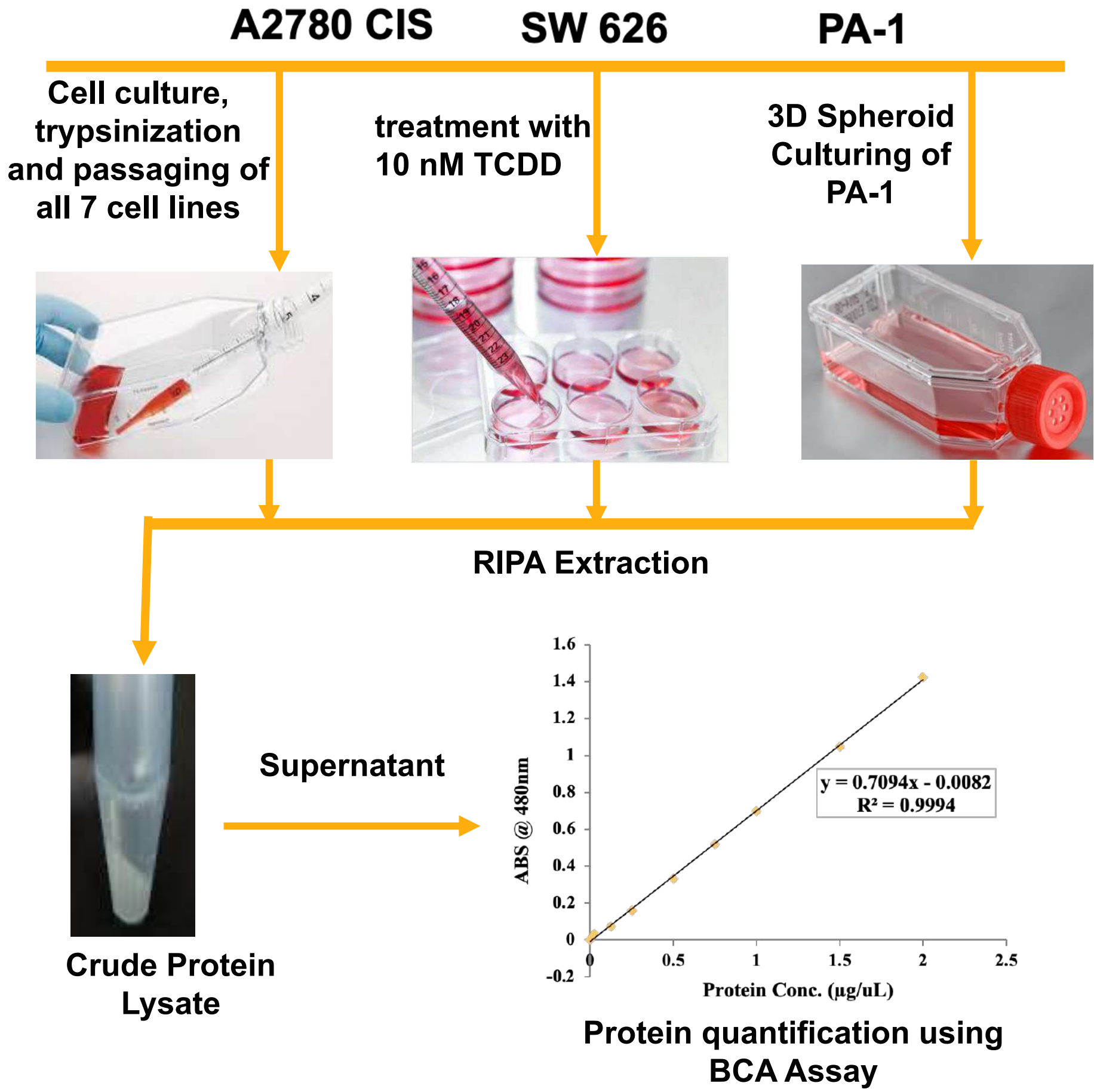
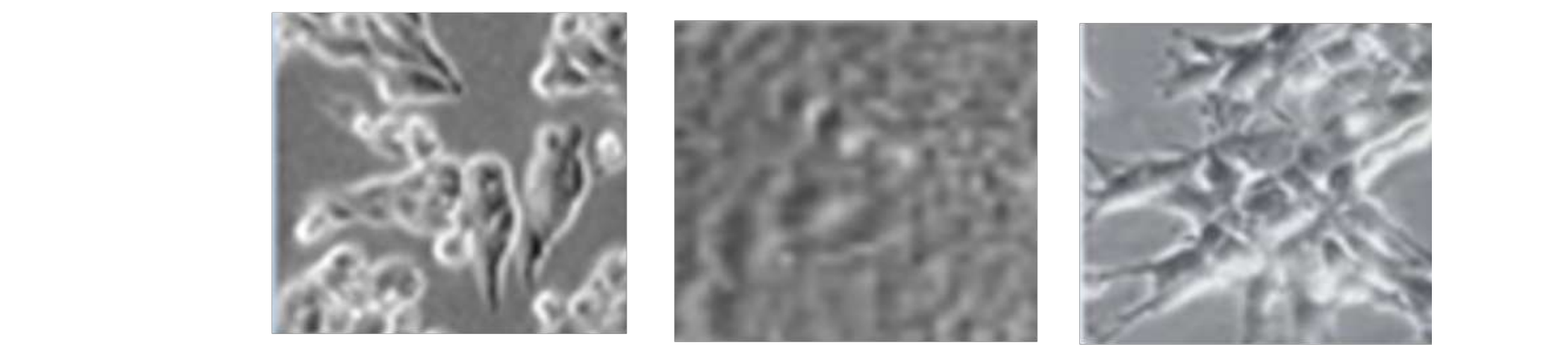
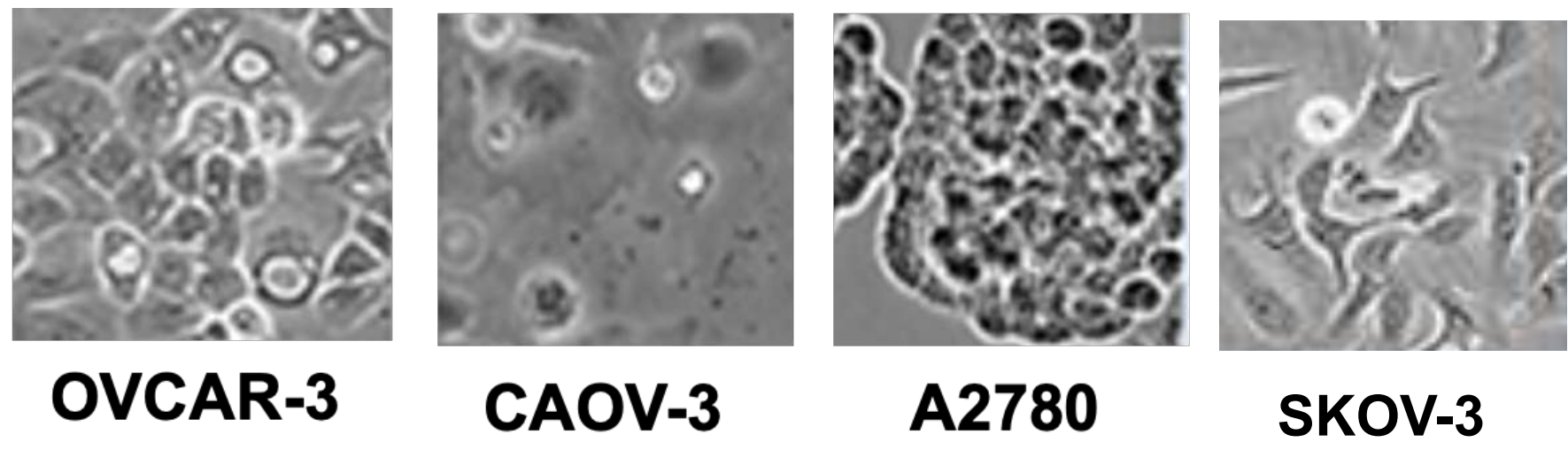
Fig. 1: Aryl hydrocarbon Receptor Pathway

## Study Objectives

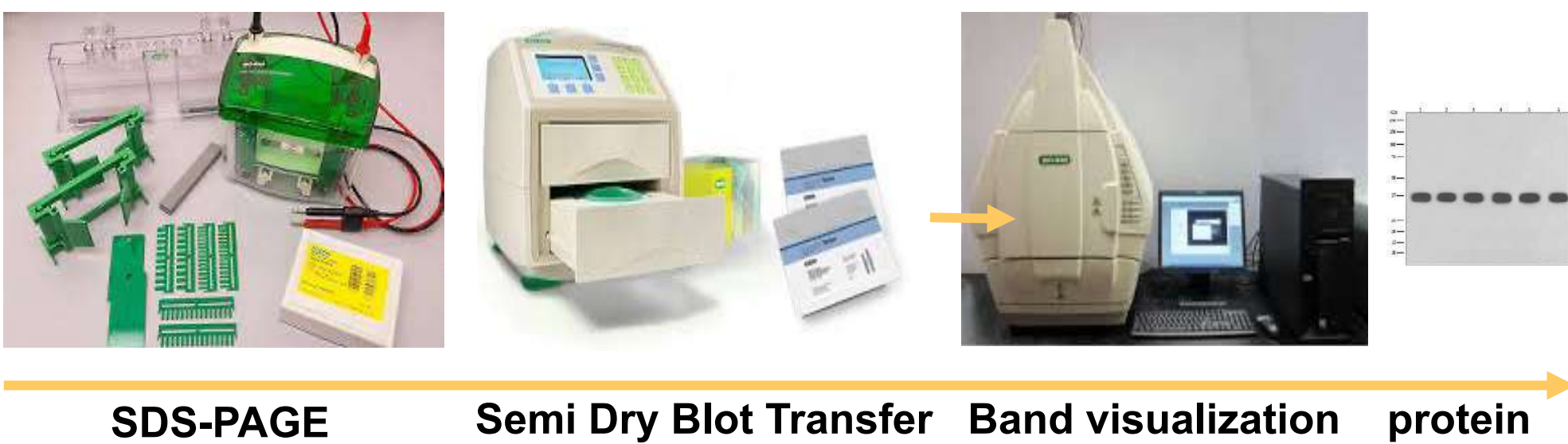
- To examine the basal expression of AhR and its regulatory genes (CYP1A1, CYP1B1 and BCL family proteins) in a panel of 7 ovarian cancer cell lines and their chemoresistance
- To investigate the effect of AhR activation on ovarian cancer development and chemoresistance

## Methods

2D and 3D Cell culture; TCDD Treatment, Protein extraction and quantification



SDS PAGE and Western blot analysis



## Results

Constitutive expression of AhR and its regulatory proteins in a panel of seven ovarian cancer cell lines

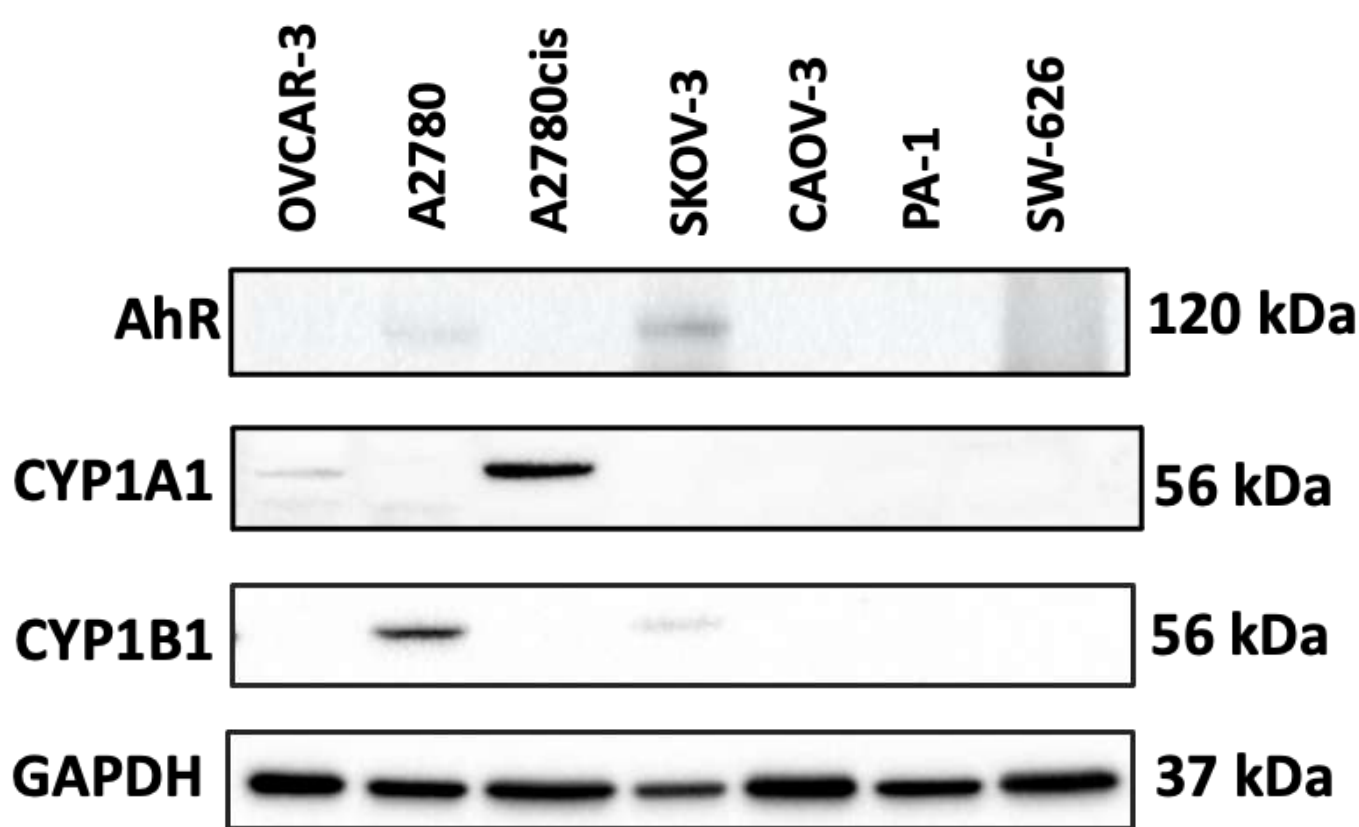


Fig 1. AhR and its regulatory proteins were observed to have a differential expression in the cell lines screened. Most of the cell lines did not express AhR constitutively.

Constitutive expression of BCL family of proteins in a panel of seven ovarian cancer cell lines

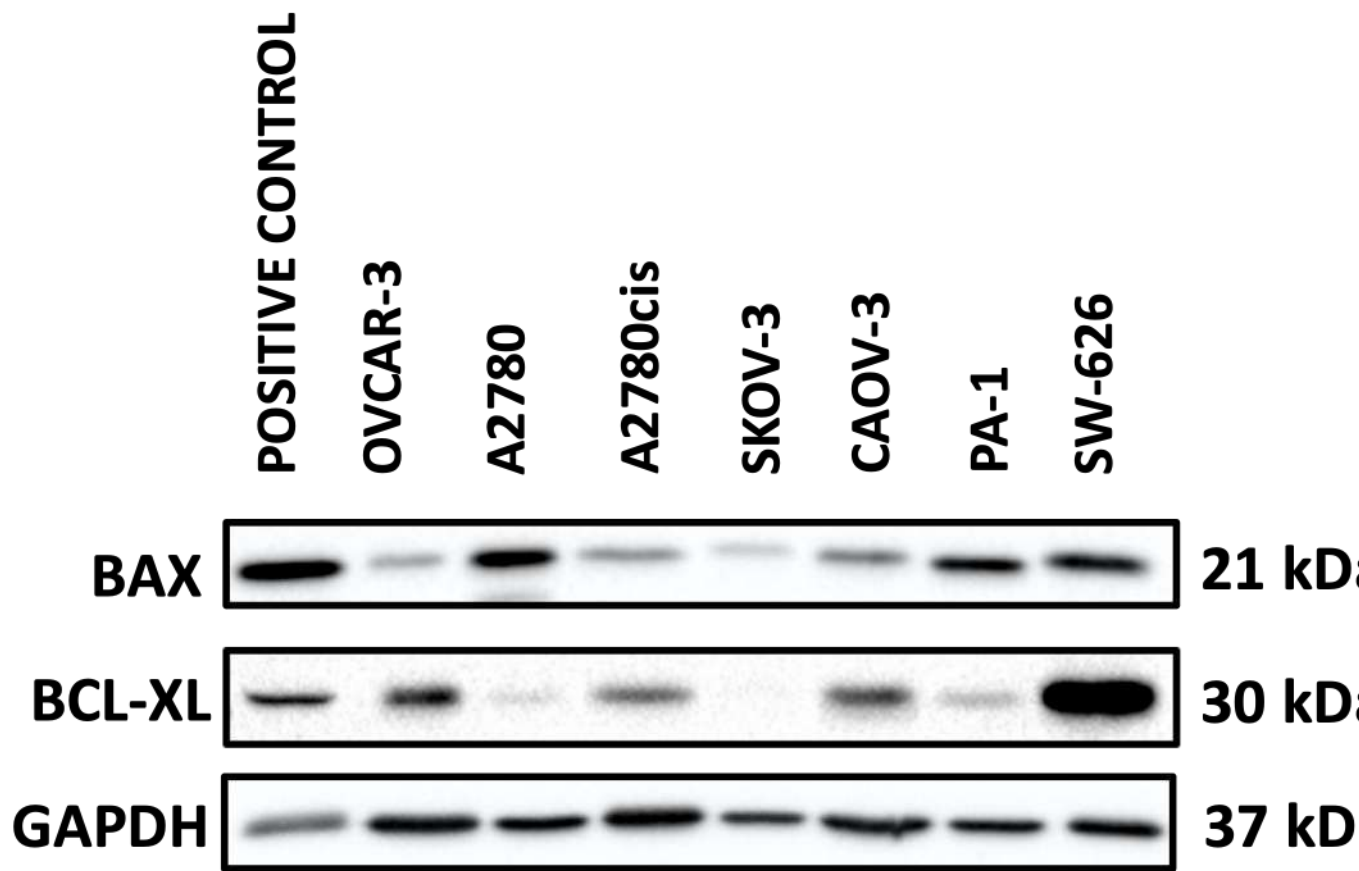


Fig 2. Out of the cell lines screened, all of them were found to express BAX differentially. All cell lines except SKOV-3 were found to be expressing BCL-XL. GAPDH served as loading control

TCDD induced expression of AhR and its regulatory proteins in candidate ovarian cancer cell lines

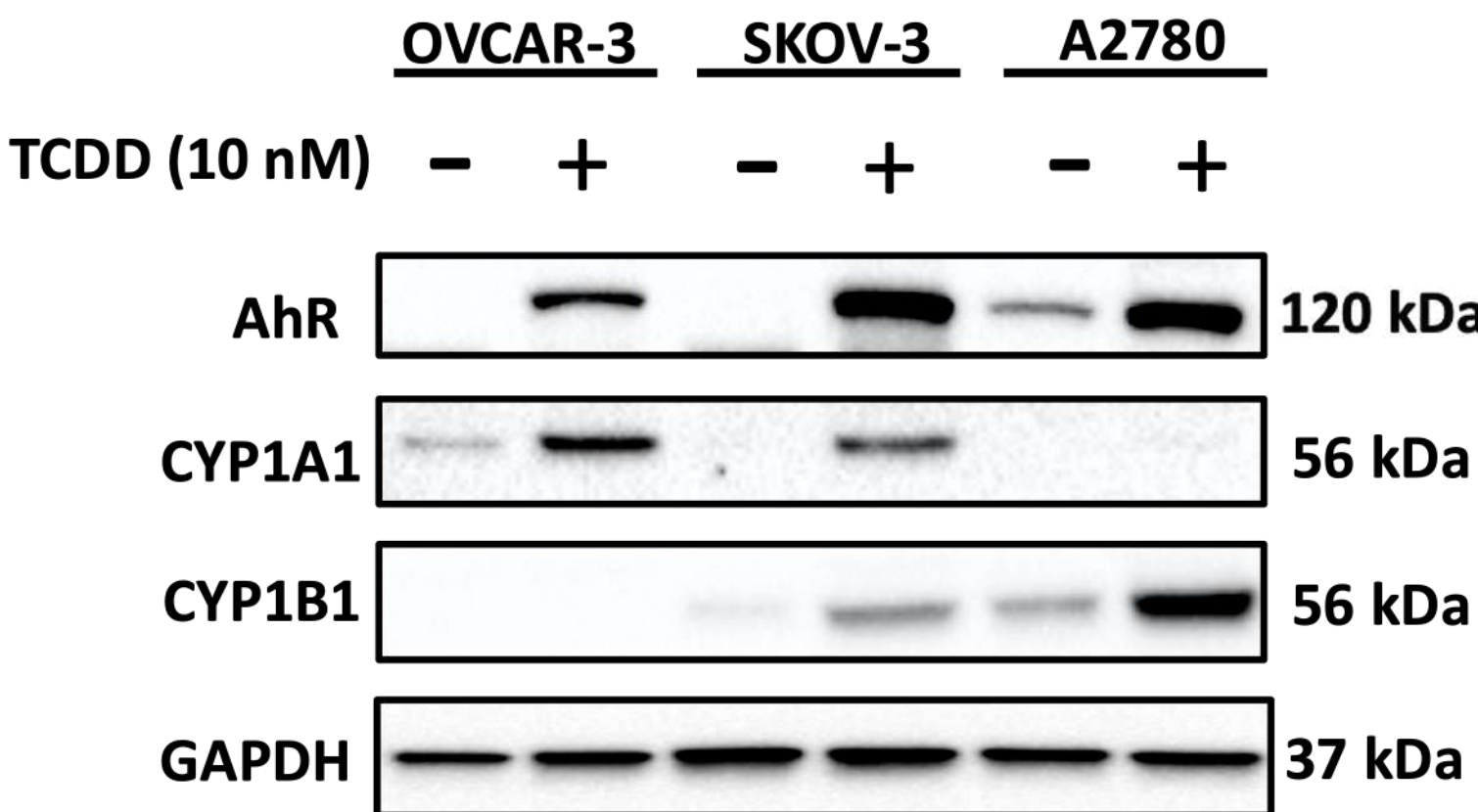


Fig 3. All the three cell lines (OVCAR-3, SKOV-3 and A2780) showed a significant increase in the expression of AhR, CYP1A1, CYP1B1 upon TCDD treatment (10nM) for 24 hrs.

TCDD induced expression of BCL-2 family of proteins in candidate ovarian cancer cell lines

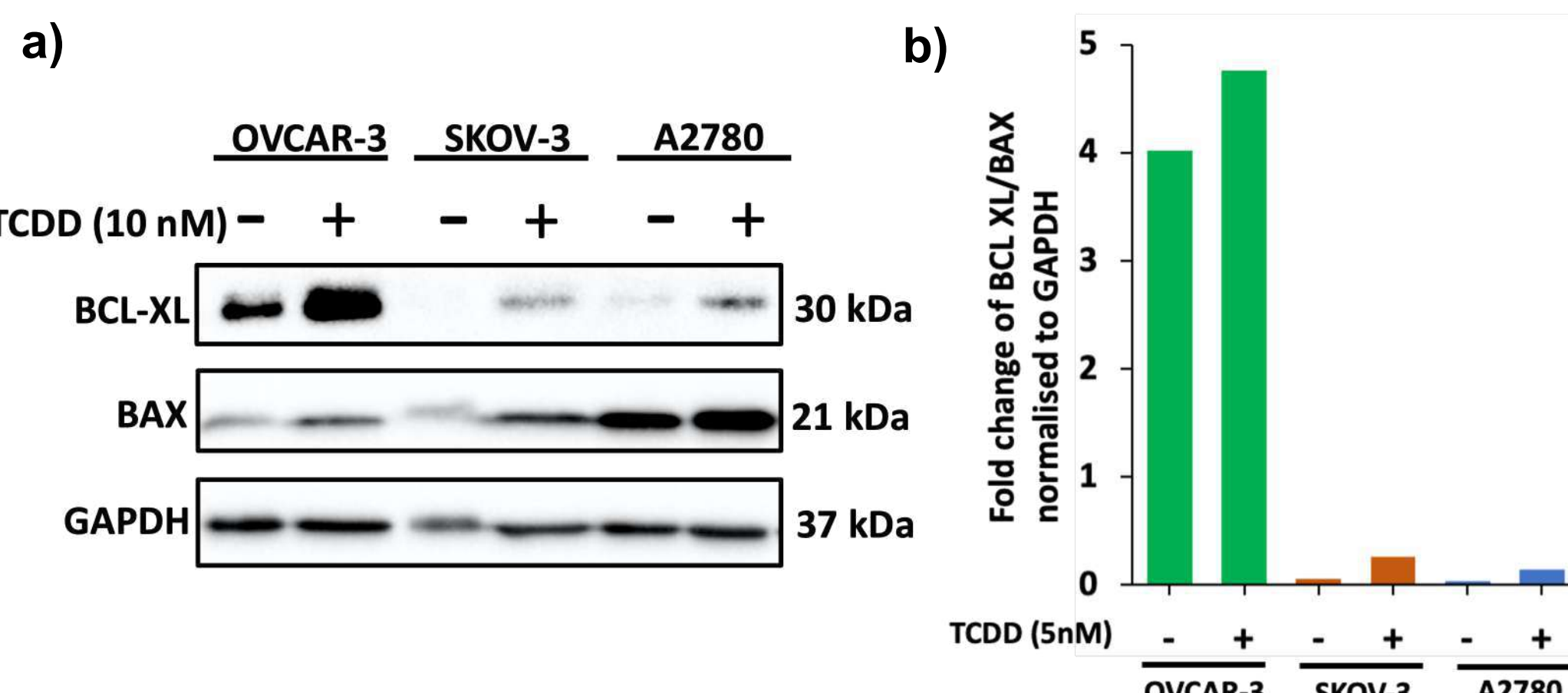


Fig 4. a. All the tested cell lines showed a significant increase in the expression of BCL-XL and BAX upon TCDD treatment (10nM) for 24 hrs. b. The ratio of BCL-XL/BAX expression which showcases apoptosis hindrance rate in cells was found to be increased upon AhR induction via TCDD in all the cell lines.

3D Spheroids in Ovarian Cancer Cells - Morphology

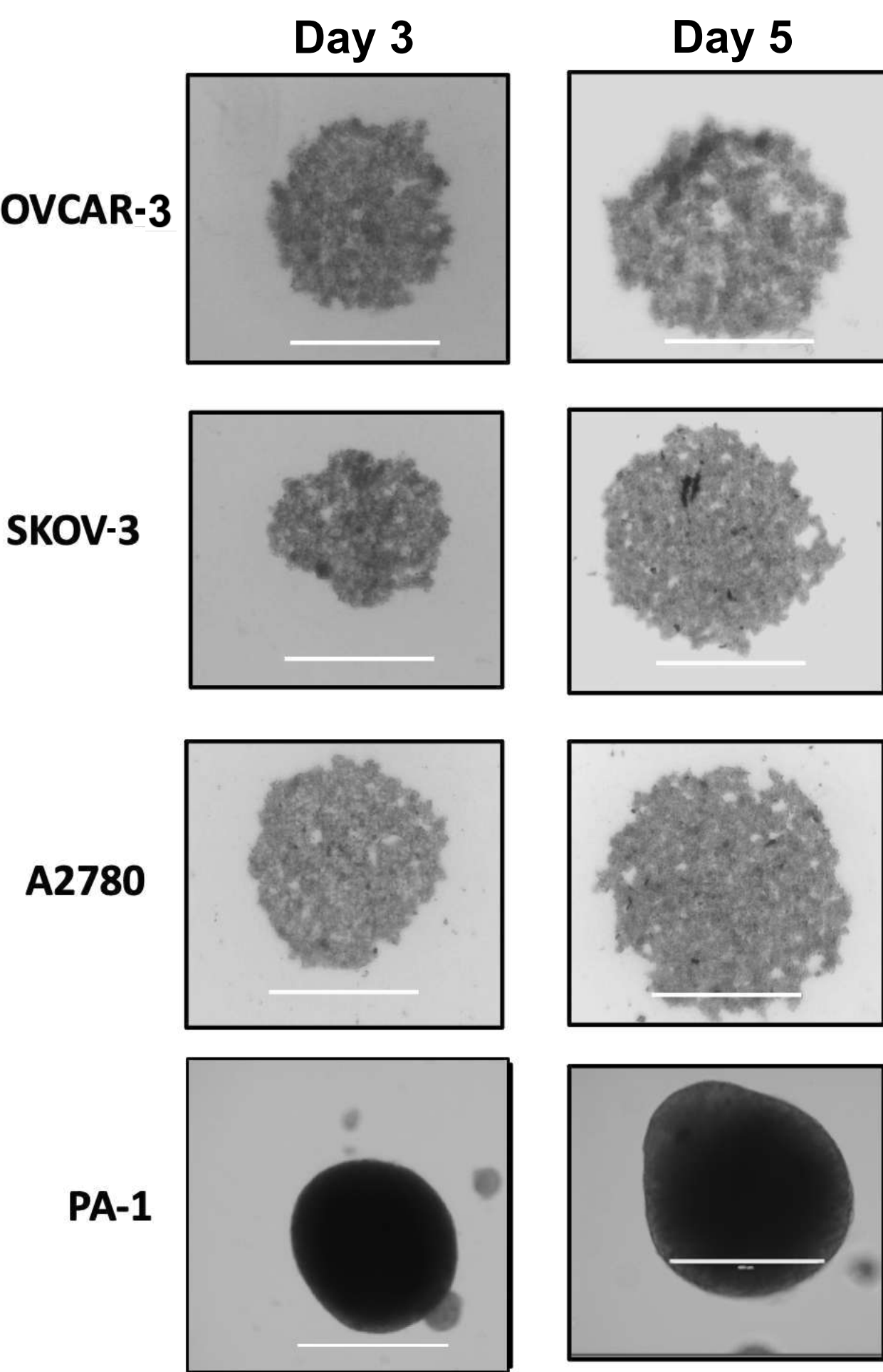


Fig 5. 3D Spheroids were grown in T75 flasks, and their morphology was monitored from day 3 until day 5. Out of the cell lines grown, PA-1 formed round shaped intact spheroids where all others were assembled as less condensed irregular-shaped loose aggregates. Scale bar = 400µm

## Results

Expression of stemness markers in 2D vs 3D culture

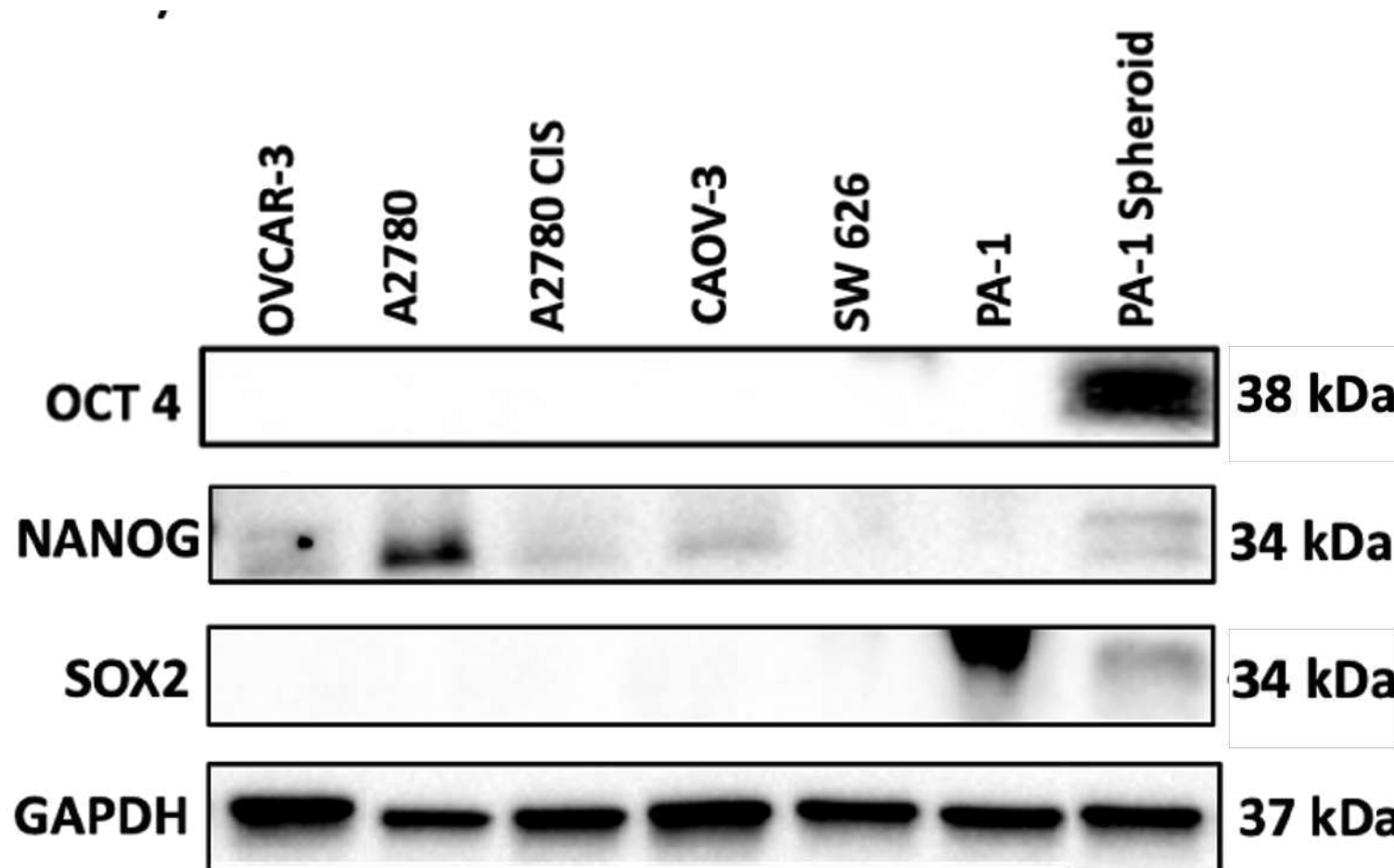


Fig 6. Stemness markers Oct4 and Sox2 were found to be expressed only by the 3D spheroid of PA-1. Nanog expression was relatively higher in A2780, whereas all other cell lines exhibited mild expression.

## Summary

- Ovarian cancer cell lines (7) were screened for basal expression of AhR and its regulatory proteins by immunoblotting
- The AhR as well as its regulatory proteins were observed to have a differential expression in the cell lines screened
- Among them, three cell lines (OVCAR-3, SKOV-3 and A2780) were selected for further studies based on their differential protein expression levels
- The three cell lines treated with the test compound TCDD (10 nM for 24h) induced the expression of AhR and its regulatory proteins with significant increase in their levels of expression as confirmed by immunoblotting
- The increased BCL-XL/BAX ratio was indicative of apoptosis hindrance in these three cell lines
- Ovarian cancer cells cultured in ultra-low attachments flasks were able to form 3D spheroids with varying morphologies

## Conclusion

AhR activation increases the expression and function of BCL-2 family proteins leading to ovarian cancer cell proliferation. This suggest a cross talk between AhR and BCL family of proteins

## Future Prospective

- AhR and BCL-2 inhibition studies to investigate the effect of BCL-2 on AhR/CYP1A1 regulation
- Proteomic study which will help in identifying the cross talk between AhR and other molecular signaling pathways and their involvement in growth and progression of ovarian cancer cells and cancer stem cells
- Tissue micro array analysis and incorporating human samples from Qatar Bio Bank

## Significance of the work

- This work is first of its kind in exploring the role of AhR in the pathogenesis of ovarian cancer
- Enable us to identify the potential signaling pathways involved in the regulation of ovarian cancer by AhR
- AhR could be recognized as a potential therapeutic target for novel anti cancer drugs for ovarian cancer
- Provide a better understanding of the regulation of cancer stem cells in relation to AhR that could help in devising novel therapeutics for better management of ovarian cancer and/or prevention

## Strengths

- Use of cell lines from different subtypes
- Successful culturing and isolation of spheroids

## Limitations

- Lack of in-vivo study
- Lack of normal cell lines

## Reference

- Feng Y, Le F, Tian P, Zhong Y, Zhan F, Huang G, et al. GTW inhibits the Epithelial to Mesenchymal Transition of Epithelial Ovarian Cancer via ILK/AKT/GSK3β/Slug Signaling Pathway. J Cancer. 2021

## Acknowledgments





# Characterization of the Aryl Hydrocarbon Receptor and BCL-2 in Molecular Subtypes of Breast Cancer Patients as a Potential Targeted-Therapy

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## Background

Breast cancer is the second most common cancer in the world, accounting for 30% of all cancers diagnosed in 2017. Since 2008, breast cancer incidence has increased by 20%, with 19% increase in mortality. Almost one million new cases are identified, and more than 410,000 patients die worldwide. In the Middle East, Qatar has one of the highest incidence and mortality rate with 39.41% BC cases from all female cancers. In 2015, 242 new BC cases were recorded with 72.08 per 100,000 people at the risk of developing BC. In Qatar, 3% of cases occur in 15-19 years of women. The Qatar Stepwise Report for Chronic Non-Communicable Diseases (NCDs) and Qatar Health annual reports indicate that cancer, cardiovascular diseases, hypertension and diabetes are a major burden and threat to the health of the Qatari community. In Qatar, with ageing and growing population, it has been suggested that the incidence of cancer in Qatar will be more than double by 2030. Consequently, implementing serious measures for decreasing the incidence, prevalence, and related mortality in the Qatari population is essential. One of these strategies is to better understand the molecular pathways and mechanisms that play important role in cancer development. One crucial example of these pathways in breast cancer is the Aryl Hydrocarbon Receptor (AhR)/Cytochrome P450 1A1 (CYP1A1) pathway (Fig. 1).

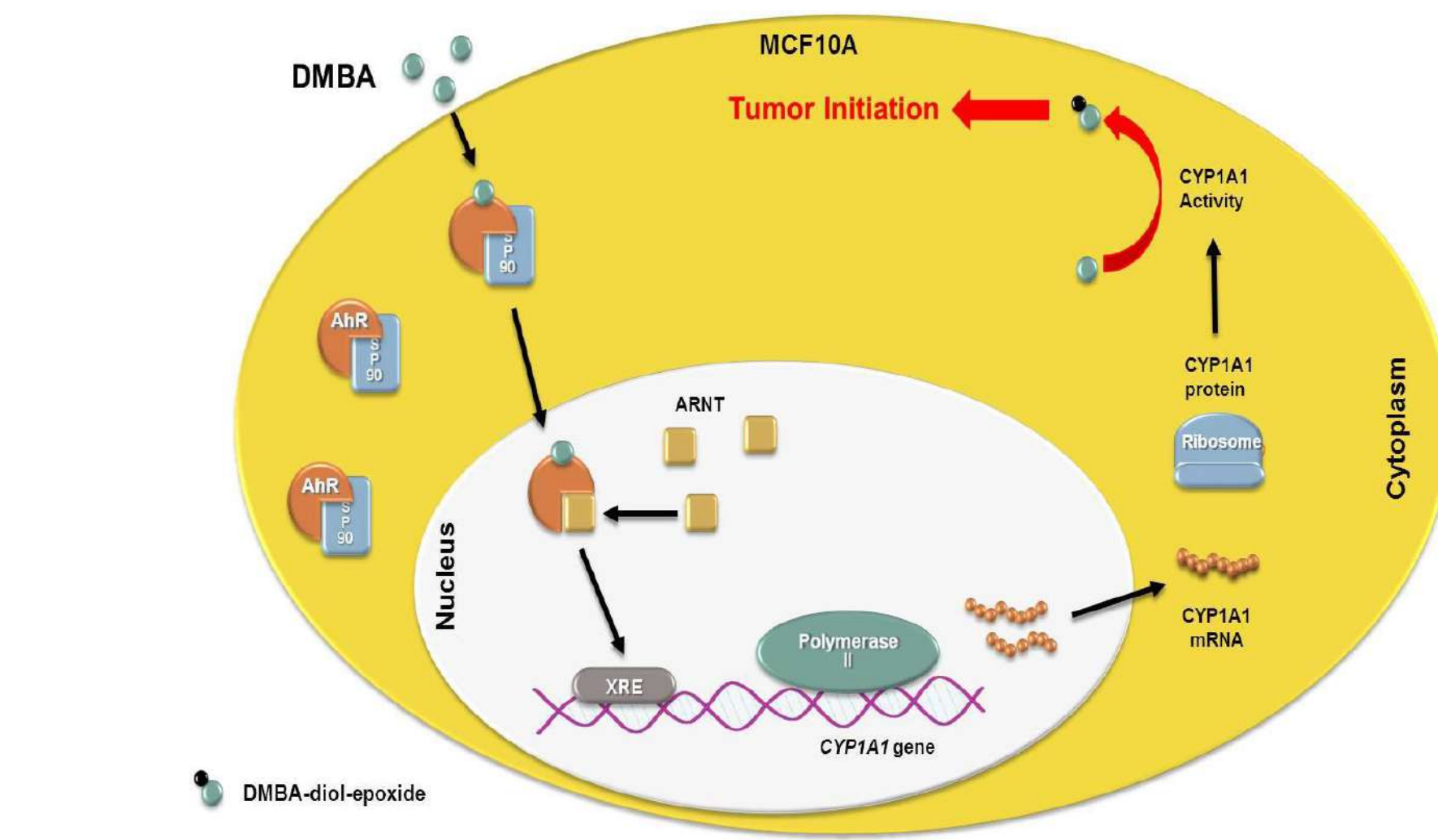


Fig. 1: AhR/CYP1A1 pathway regulation

Recent proteomic analysis of AhR/CYP1A1 activation in human breast cancer cell line has identified 1500 different proteins that were significantly affected, among which, Bcl-2 protein was the most upregulated (>1000 fold), suggesting a possible role for Bcl-2 pathway in breast cancer. Unfortunately, most of these studies were conducted either in cell lines or in animal model, whereas the characterization, expression, and activity of the AhR/CYP1A1 pathways in human breast cancer tissues remains uninvestigated. Thus, the main aims of the current study to explore the expression of AhR and Bcl-2 in human breast cancer tissues.

## Study Objective

- To examine the basal expression of AhR and and BCL-2 in different subtypes of breast cancer patients.
- Correlate the expression of AhR and BCL-2 with cancer subtypes and grades.

## Methods

### Breast tissue (Tissue microarray TMA)

- Breast cancer Tissue MicroArrays TMA are unstained ready-to-use microscope slides, commercially available, consisting of many cores of human FFPE tissues from normal and different breast cancer subtype and matched metastases (Fig. 2).

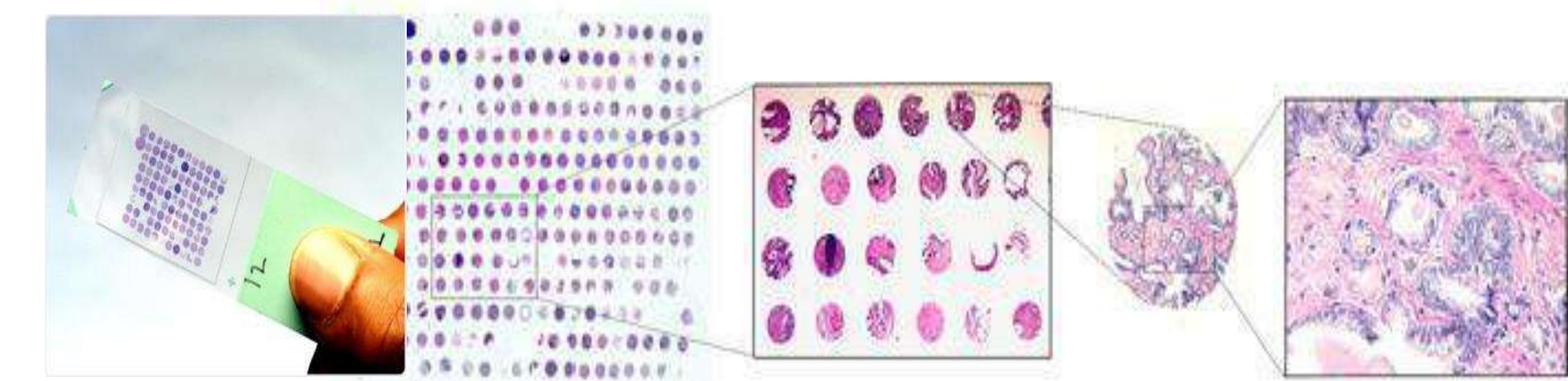


Fig. 2: TMA (www.biomax.us)

- Human breast cancer FFPE TMA samples were purchased from US BioMax (www.biomax.us). Tissue microarray (TMA) of 99 human breast carcinoma of normal and different breast cancer subtype and matched metastases was purchased from US Biomax Inc (USA). The breast tissues (TMA) were divided into five groups; luminal A, luminal B, HER-2-type, and triple negative breast cancer (TNBC).

## Methods

### Immunohistochemistry

Immunohistochemistry was performed on formalin-fixed, paraffin-embedded sections from mammary glands of both cancerous and non-cancerous women as described previously (24). Tissue sections will be incubated overnight at 4 ° C with the following primary antibodies diluted in PBS-0.1% BSA: anti-AhR (1:50); anti-BCL-2 (1:50). After washing, sections will be stained for 30 min at RT, with Labeled Polymer (EnVision+) horseradish peroxidase (HRP) detection kit as a secondary antibody. Color was developed with 3,3'-diaminobenzidine (DAB) and instant hematoxylin will be used for counterstaining. Slides will be then observed under light Olympus BX51 microscope and DP72 Camera (12 MG Pixel).

## Results

Table 1: Patients and tumor characteristics

Characteristics	Groups	Number of patients
Types	Control patient	6 (8%)
	Cancer patients	69 (92%)
Age	≤50	44 (58.6%)
	>50	31 (41.3%)
Estrogen Receptor Status	ER-positive	32 (49.2)
	ER-negative	33 (50.8)
	Not tested	4
Progesterone Receptor Status	PR-positive	38 (58.5)
	PR-negative	27 (41.5)
	Not tested	4
HER2 Expression Status	HER2-positive	21 (31.8%)
	HER2-negative	45 (68.1%)
	Not tested	3
TNBC	TNBC-Positive	12 (18.4%)
	TNBC-Negative	53 (81.5%)
	Not tested	4
T-Stage	T0	7 (10.44%)
	T1	3 (4.47%)
	T2	36 (53.7%)
	T3	13 (19.4%)
	T4	8 (11.9%)
N-Stage	N0	43 (64.1%)
	N1	11 (16.4%)
	N2	13 (19.4%)
	Not tested	2
Metastasis	No	69
	Yes	0
Grade of Tumor	Grade I	4 (6.8%)
	Grade II	39 (67.2%)
	Grade III	15 (25.8%)
	Not tested	11
Ki67 Status	≤40%	37 (63.7%)
	>40%	21 (36.2%)
	not tested	11

Table 2: Association between AhR and BCL-2 and currently established prognostic markers

			Percentage of patients
AhR Status	Control	High positive Low positive	2 (25%) 4 (75%)
	ER-positive	High positive Low positive	28 (87.5%) 4 (12.5 %)
	PR-positive	High positive Low positive	6 (15.78%) 33 (86.85%)
	HER2-positive	High positive Low positive	5 (23.8%) 16 (76.2 %)
	TNBC	High positive Low positive	5 (41.66%) 7 (58.33%)
BCL-2 Status	Control	High positive Low positive	40 (40%) 60 (60%)
	ER-positive	High positive Low positive	28 (87.5%) 4 (12.5 %)
	PR-positive	High positive Low positive	32 (84.21%) 6 (15.78%)
	HER2-positive	High positive Low positive	17 (80.95%) 4 (19.05%)
	TNBC	High positive Low positive	8 (66.67%) 4 (33.33%)

Table 3: Correlation of AhR and BCL-2 expression with cancer stage

	AhR	BCL-2
Normal breast tissue	1	1
Breast cancer Grade I	2.3	1.4
Breast cancer Grade II	2.2	1.3
Breast cancer Grade III	1.6	1

## Results

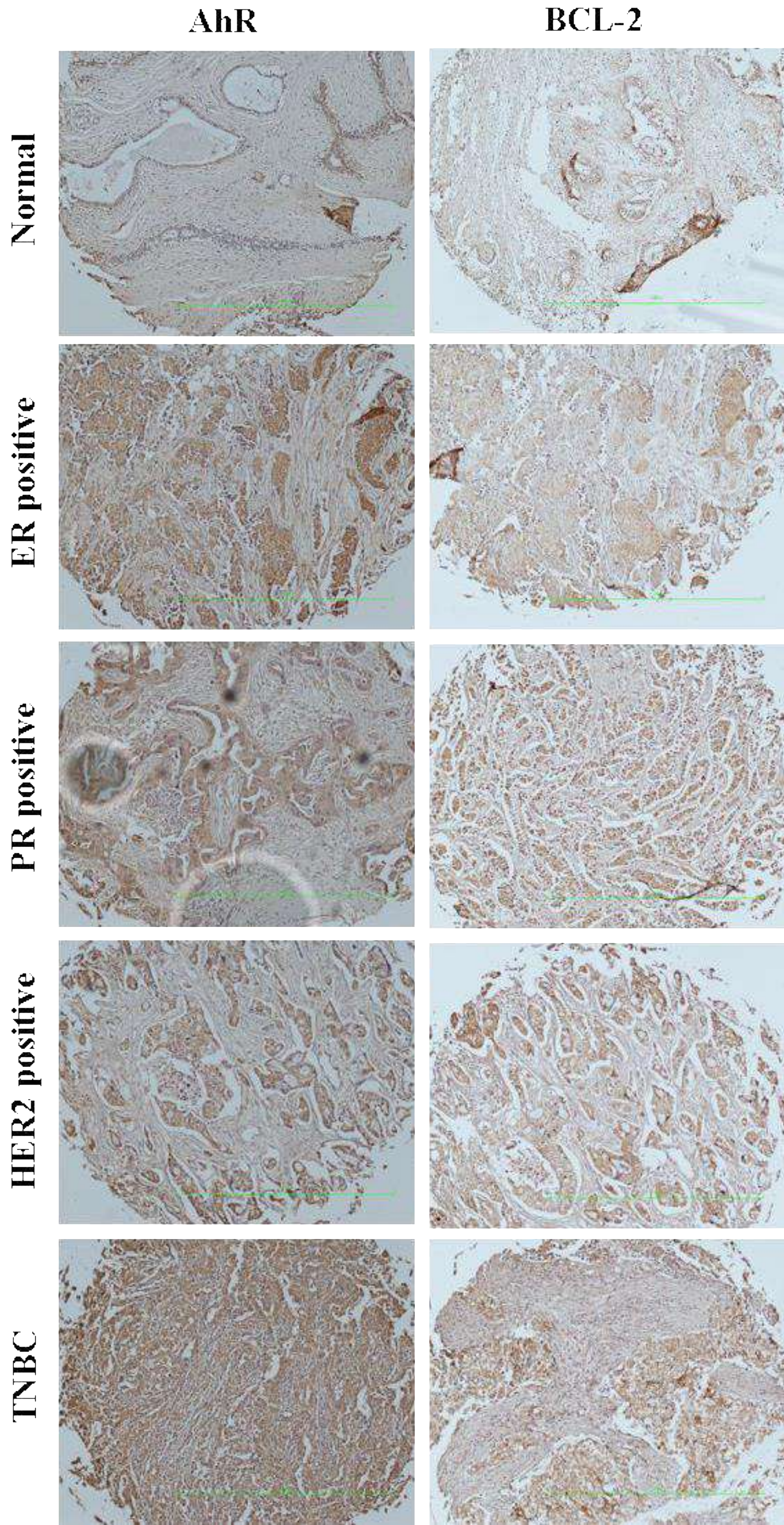


Fig 3: Immunostaining of 75 different breast cancer tissues with AhR and BCL-2 (brown) antibodies followed by secondary antibody. Each tissue sample was stained in triplicate for each antibody.

## Summary

- Using IHC, a stronger immunostaining of AhR and BCL-2 proteins was detected in BC patients than the normal patients.
- The expression of AhR and BCL-2 in cancer patients is almost double compared to healthy subjects.
- 87% of ER-positive cancer patients expressed high level of both AhR and BCL-2 compared to only 25% of the healthy control tissues. Similar pattern of expression was also observed with all molecular subtypes.
- The expressions of AhR and BCL-2 were positively correlated with early stages of breast cancer, indicating their role in cancer initiation.
- The results revealed that AhR and BCL-2 protein expressions were positively correlated.

## Conclusion

Expression of AhR in different sub-types of breast cancer is positively correlated with the expression of BCL-2. The expression of AhR and BCL-2 are significantly correlated with the early stages of cancer. This suggest a cross talk between AhR and BCL family of proteins.

## Significance of the work

- This work is the first of its kind in exploring the crosstalk between AhR and BCL-2 in breast cancer.
- Identification of the potential signaling pathways involved in the regulation of breast cancer by AhR and BCL-2
- AhR and BCL-2 could be recognized as a potential therapeutic target for novel anti cancer drugs for breast cancer

## Acknowledgments

This study was supported by QNRF UREP grant # UREP24-163-3-049



# Are Blood Pressure Devices Sold in Qatar Community Pharmacies Validated?

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## Background

- Hypertension is a leading cause of cardiovascular morbidity and mortality globally and in Qatar
- Yet it remains under-detected and poorly controlled
- Home BP monitoring (HBPM) devices help to monitor BP and response to therapy
- Community pharmacist managed HBPM services have been shown to provide better control of hypertension
- BP monitors need to be accurate and valid to provide accurate and reliable estimate of BP
- Non-validated devices may provide abnormally high or low BP readings which could lead to poor BP control and health risks

## Study Objectives

- Community pharmacists play important role in advising and actively participating in health promotion interventions that include proper counseling on BP monitoring devices and techniques
- The objectives of our study were to
- a) identify the proportion of BP devices that are not validated and
- b) to determine the relationship between the validation status of devices sold in Qatar, and their price, brand and model, and cuff location

## Methods

- Our study was approved by the QU-IRB #1516-EA/21
- Data were collected from at least 2 of the chain pharmacies and at least 8 independent pharmacies in Doha, Qatar
- Data related to BP device brand/ model, cuff location (arm or writst), validation status, and price were collected

## Interim results

- 13 different pharmacies were visited
- Data on a total of 73 devices were screened
- 56 models from 12 different brands are available in Qatar community pharmacies
- Beurer, Omron and Rossmax are the most commonly available brands
- Upper arm devices are available more than wrist devices

## Interim results cont'd

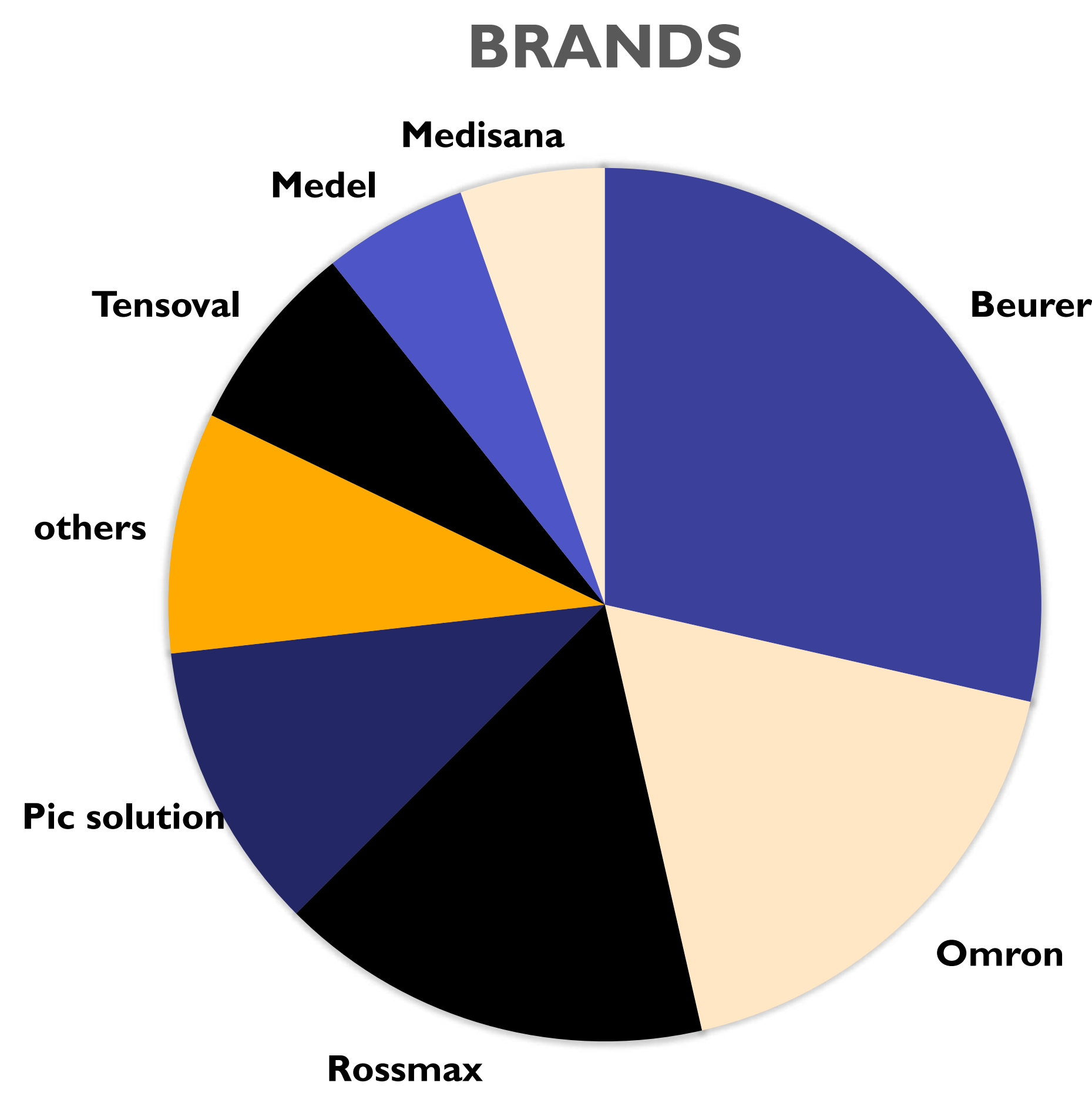


Figure 1: The brands present in community pharmacies in Qatar

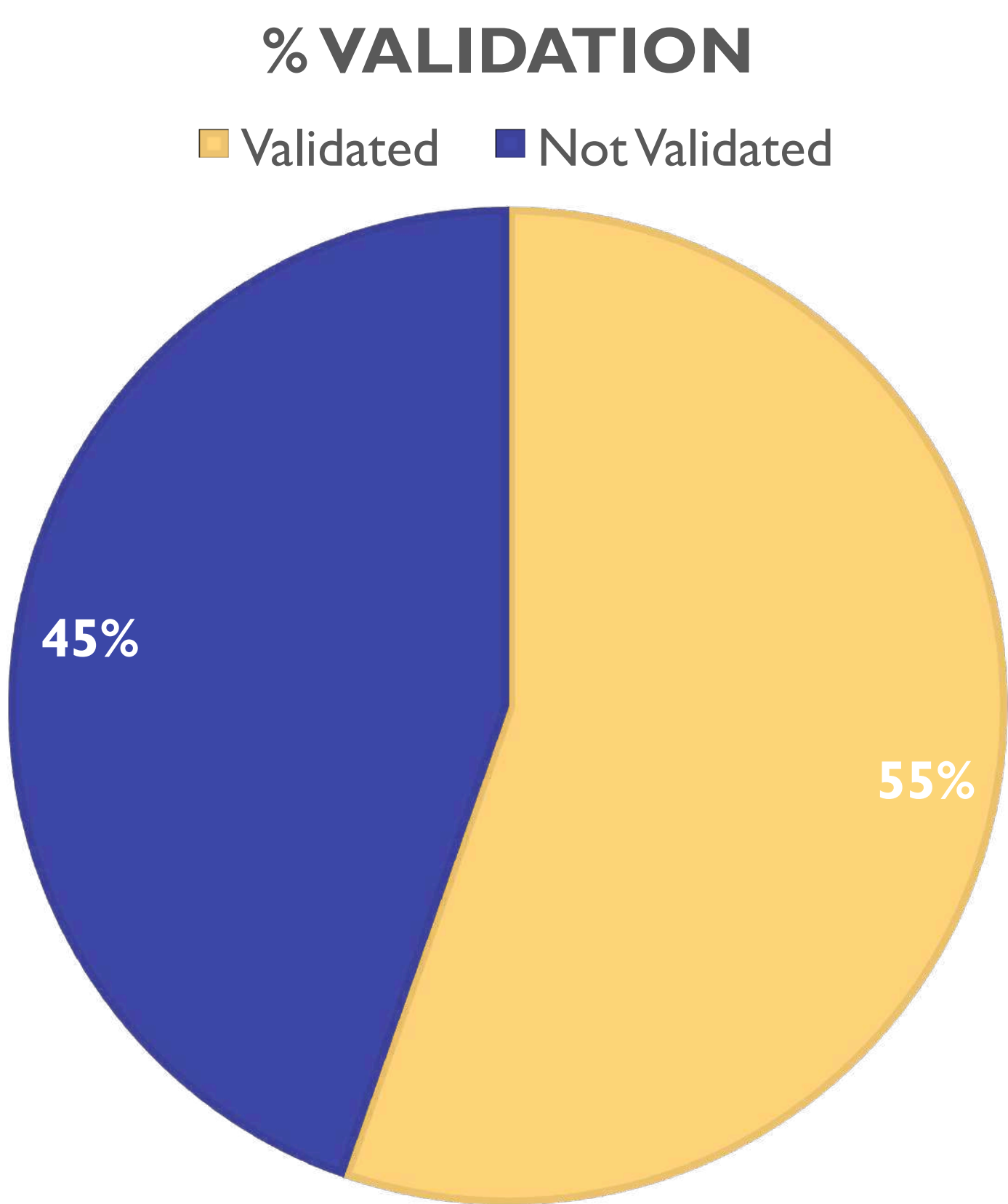


Figure 2: The validation percentage of devices.

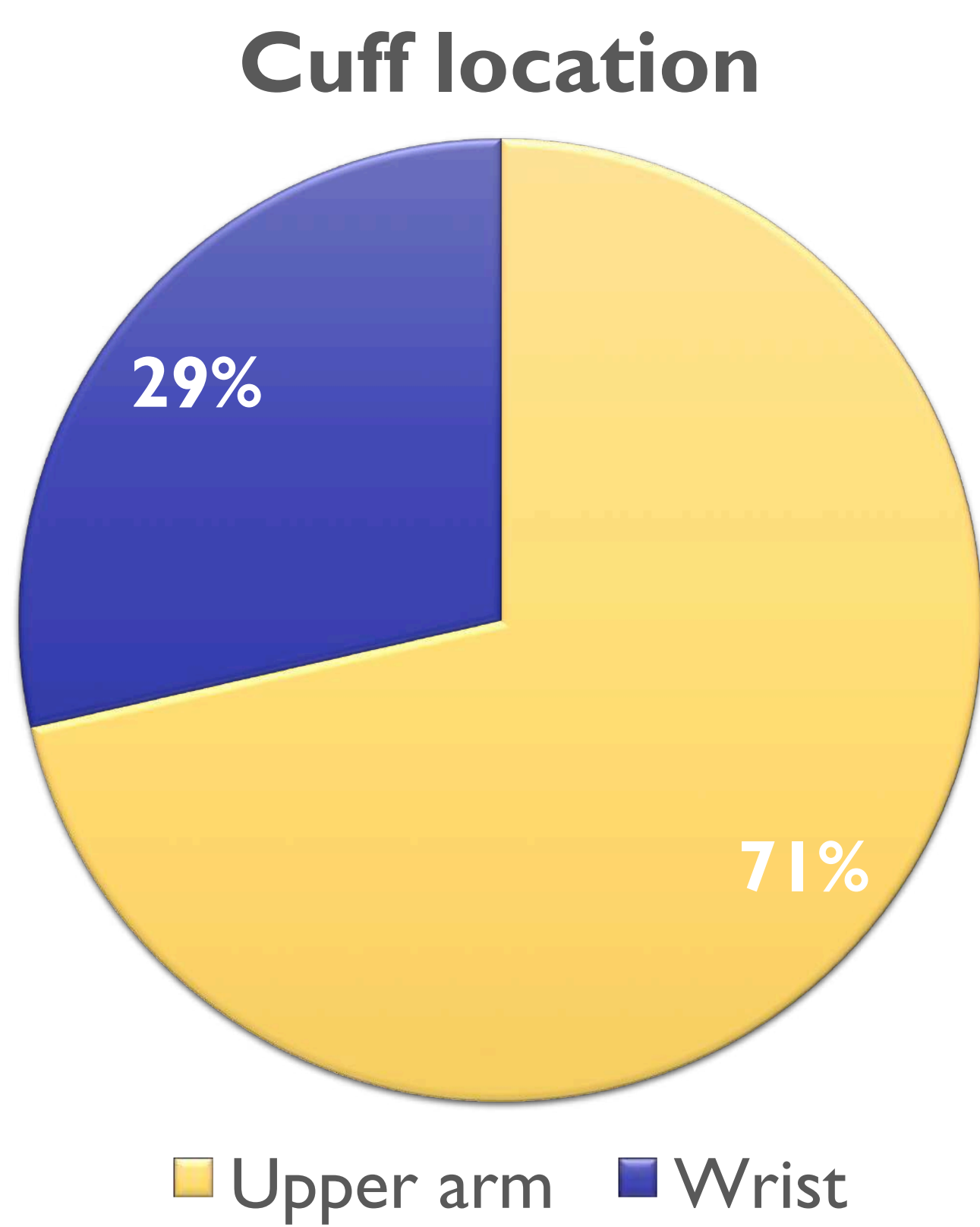


Figure 3: The distribution of cuff location among devices.

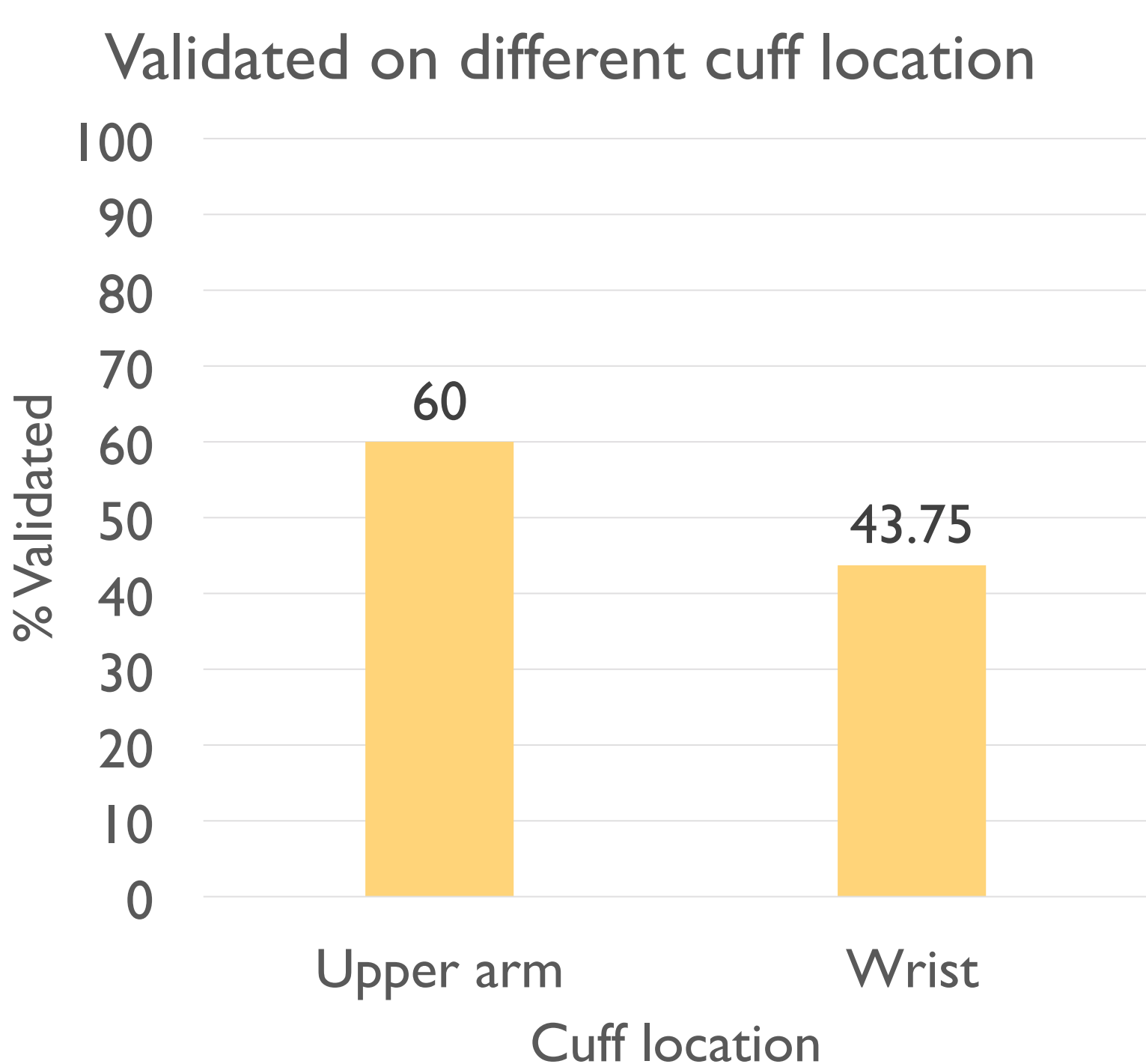


Figure 4: The cuff location in validated devices.

## Interim results cont'd

Price range	Validated	Not validated	Percent not validated
≤ 250	7	7	50%
251-500	20	15	43%
501-750	4	1	20%

Table 1: Devices not validated compared to price.

- Only 55% of devices are validated
- More upper arm devices are validated than wrist devices
- 37.5%, 50%, 55.5% of Beurer, Omron and Rossmax models are validated respectively
- Most devices available in Qatar are validated by the ESH, followed by BSH, or both
- In general, a higher proportion of higher priced devices are shown to be validated compared to less expensive devices
- On the other hand, generally, cheaper devices tend to be not validated

## Conclusions

- Almost half of the BP devices sold in community pharmacies in Qatar are not validated
- This is a significant barrier to precise and accurate home BP monitoring, and cardiovascular risk management
- Sale of BP devices should be regulated and validated by MOPH in Qatar to ensure patient safety

## Limitations / future directions

- Study in progress
- We plan to obtain data many more chain and independent pharmacies
- Upcoming tasks are:
- Evaluate the knowledge, perception and attitude of community pharmacists in terms of accuracy of information and in directing customers to a validated home BP device
- Evaluate the accuracy of BP devices sold in community pharmacies

## Acknowledgement

This study was made possible by the Undergraduate Research Experience Program (UREP) grant UREP27-007-3-001 of the Qatar National Research Foundation



## Background

- QTc interval prolongation (QTcIP) leads to serious complications making it a concern for all clinicians.
- Assessing the risk of QTcIP, especially in the psychiatric population, can present as a challenge for pharmacists and often results in cardiology referrals thus delaying treatment decisions.
- Based on an extensive literature review, an algorithm was developed for the assessment, monitoring and management of drug-induced QTcIP in the psychiatric population.

## Objectives

- To determine the content validity of the algorithm from a panel of subject matter experts, including cardiologists, by rating the appropriateness of the algorithm steps and exploring its utility in clinical practice.

## Methods/Materials



## Results

### Semi-Structured Interviews: Themes and Subthemes

Reliance on ECG readings

- Baseline and follow up ECG
- ECG monitoring

Clinically guided prescribing

- Patient’s clinical/medication histories
- Drug interactions
- Drug information resources (i.e. BNF, Medscape, etc.)
- Unawareness of specific drug-induced QTcI resources (i.e. Credible Meds)

Limited availability of protocols

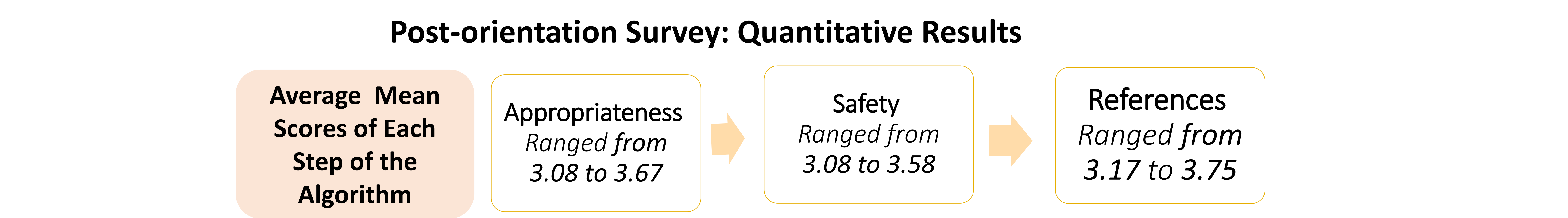
- No specific guidelines
- Lack specific clinical protocol
- Limited awareness or use of risk assessment scoring tools

Assessment for QTc prolongation

- History of QTc prolongation
- Medical and family history
- Physical signs and symptoms
- Clinical risk factors

### Post-orientation Survey: Qualitative Results

Difficulties in ECG interpretation/calculation  
Time consuming  
Needs simplification  
Clarify some scores/steps/cutoff-points  
**Cumbersome/Complicated**  
**Should be used by pharmacists**  
Thorough  
No barriers to use  
Systematic  
No concerns  
No weaknesses  
Incorporate more evidence  
Easily implemented  
Easy to use  
Doesn't consider gender in management



## Conclusion

- Interview results indicate that there's a lack of a unified protocol which supports the need for an algorithm.
- Survey findings show that a majority of cardiologists found the algorithm to be very reliable or reliable if minor alterations are made.
- Implementation of the algorithm could prove to be useful for the assessment and management of drug-induced QTcIP in the psychiatric population.



# Evaluation of a Mobile Application Tool to Assist Health Care Providers in Cardiovascular Risk Assessment and Management

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## Background

Mobile technology offers the opportunity to overcome some of the barriers that have been reported in accessing cardiovascular disease risk assessment and management (CVDRAM) services in the community. An Arabic and English mobile application that incorporates the EPIRxISK™ CVD risk calculator, a tool developed at the EPICORE Center, University of Alberta in Canada, and provides an individualized and interactive process to estimate CVD risk for patients based on their risk factors and comorbidities. EPIRxISK™ uses three validated risk engines (Framingham5, UKPDS6 and SMART7) to estimate CVD risk.

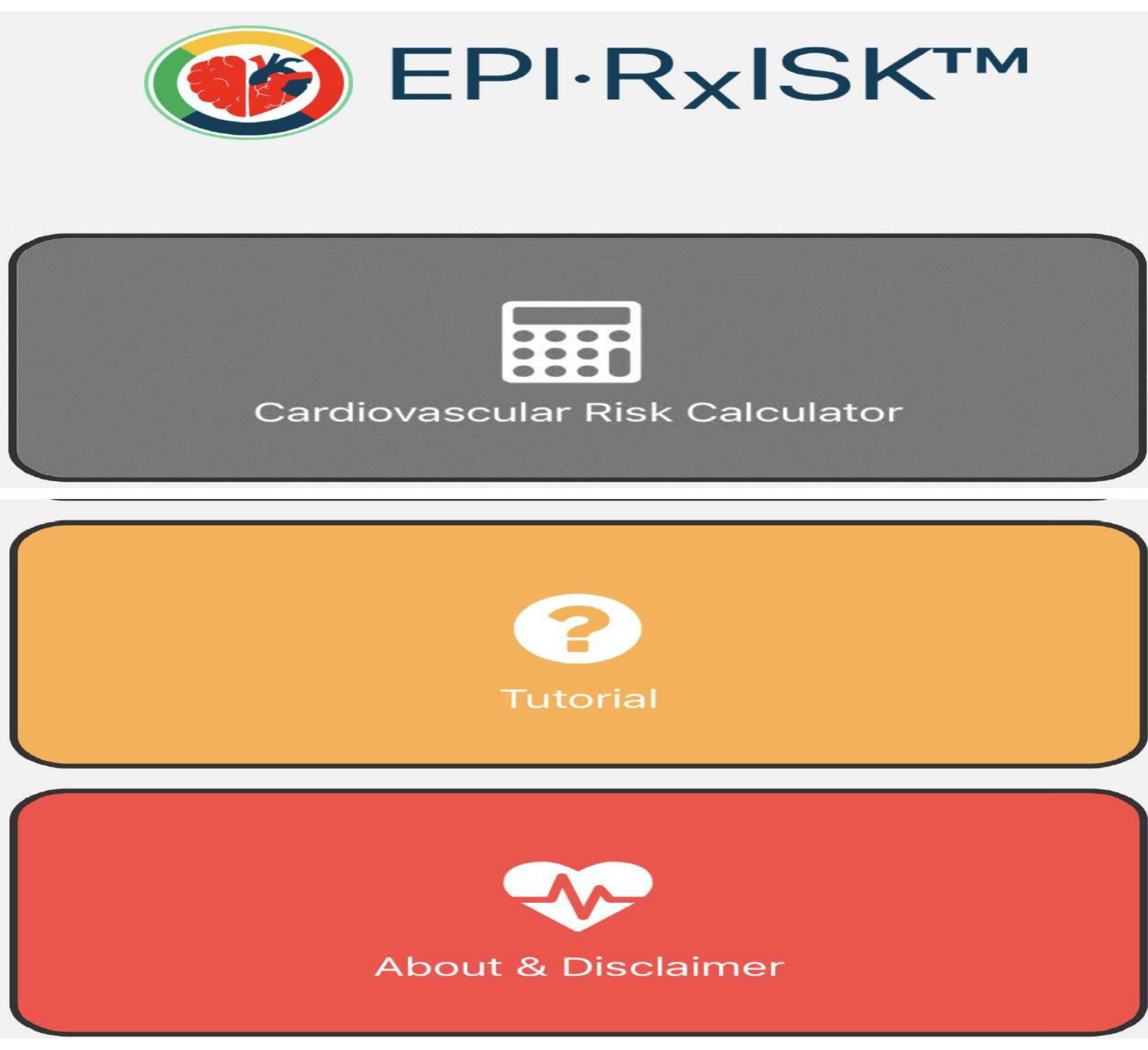
## Study Objectives

The main goal of this study is to pilot test the EPIRxISK™ application and investigate whether the use of technology for CVDRAM, combined with appropriate health care professional oversight, can improve access and management of CVD risk factors in Qatar.

## Methods

- **Study design:** This study is of a qualitative pilot design.
- **Settings:** Community pharmacies in Qatar (WellCare Pharmacies Group).
- **Sample size:** 10 community pharmacists and 5 general population (GP).
- **Eligibility criteria:** Adults > 18 years of age, able to provide consent, fluent in either Arabic or English, and capable of using online applications.
- **Data analysis:** Coding framework was developed through an iterative process..
- **Ethical approval:** Qatar University Institutional Review Board (QU-IRB) : QU-IRB 1298-EA/20.
- **Tool:** Mobile and Web versions of the EPIRxISK™ were developed.

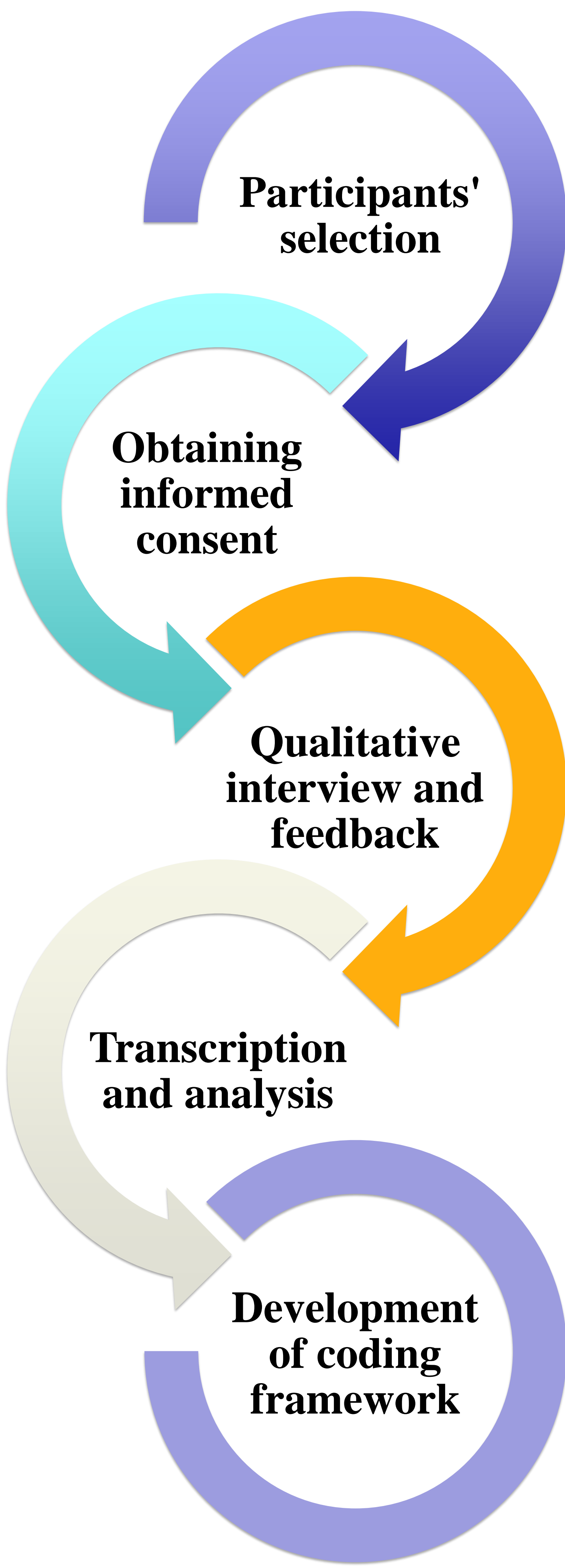
Figure 2. EPIRxISK Mobile Application (GP's) Version



## Methodology Cont'd

- **Procedure:**

Figure 1. Data Collection Procedure



## Results

- The results from the interviews conclude an overall acceptance and satisfaction with the features of the application.
- Most of the responses pertaining to the application were positive.

Table 1. Emerging Themes from Pharmacists' Interviews

Framework	Theme
Engagement	High interest due to the presence of sufficient content
Functionality	Good functionality in terms of high performance and accuracy
Aesthetics	High level of visual appeal
Information	Comprehensive, clear and concise information
Subjective Quality	Frequent use, high rating, and willingness to recommend to relevant population

## Results Cont'd

Table 2. Emerging Themes from GPs' Interviews

Framework	Theme
Engagement	Interesting and engaging content
Functionality	Accurate and user friendly
Aesthetics	Simple and professional layout
Information	Contains thorough and important information
Subjective Quality	High rating and willingness to use and recommend to relevant population

## Conclusion

Overall, the results from the pilot testing are promising and demonstrated an overall positive feedback about different features of the application. Majority of the responses rated the application's functionality and usability highly with minor concerns that the application may be time consuming.

## Limitations

- Time consuming in busy community pharmacies.
- Restrictions and precautionary measures related to COVID-19 pandemic may impact the feasibility of implementing this application since CVD patients are at an increased risk of complications.
- Certain patients may not be fully comfortable with spending time sharing private data and information about themselves, especially in the absence of a private space in community pharmacies.

## Future Plan

- Results of this study provides data that will be used to fine-tune the EPIRxISK™ application and ensure its usability.
- A phase II of this project will be undertaken to assess the assess the feasibility of implementing a community pharmacy-based CVD risk assessment program using the English and Arabic versions of the EPIRxISK™.



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